NOVEMBER 1956

FACTORY

MANAGEMENT AND MAINTENANCE

A McGRAW-HILL PUBLICATION • FIFTY CENTS

THE 4-DAY WEEK?

POLITICS IN '58

DEMAND IN '58

REALITY IN ???

PAGE 84

EDITED EXCLUSIVELY FOR THE PLANT OPERATING GROUP

INDUSTRIAL BUILDING
60x240, 14,400 sq. ft. per floor, 3 floors plus basement.
57,600 sq. ft. 20 ft. bays.
PRICED TO SELL
Sprinklered
Reinforced concrete and brick; firep
y heavy con-
struction and floor loadings. A-1 condition, good parking, spur track,
large freight elevator, also automatic passenger elevator. Top floor fitted
as office.
Manufacturing Space for Rent
Sprinklered
FOR LEASE
MODERN INDUSTRIAL PLANT
60,000 SQ. FT. ON STREET LEV
10,000 SQ. FT. ENGINEERING & A
ISTRATIVE OFFICES ON 2ND FLO
Sprinklered
FOR INFORMATIO
BOX 7492

Stops Fires
and attracts buyers

Your primary concern, when you install a Grinnell Automatic Sprinkler System, is *protection* of property against a disastrous fire. For no amount of insurance, you realize, can fully reimburse you for the loss of buildings, inventory, records, valued customers, or invaluable lives.

Yet it is gratifying to reflect that Grinnell Sprinklers increase the *value* of your property as well. As these typical real estate advertisements indicate, "sprinklered" is an important *plus* in the sale or lease of a building. It carries weight with business management.

In fact, you more than get your money back from Grinnell Fire Protection. When you consider that installation of a sprinkler system reduces fire insurance premiums from 50% to 90%, it becomes an investment that pays for itself within a few years, and then starts paying you substantial cash dividends.

We shall gladly survey your property and submit an estimate, without cost or obligation. Write or phone Grinnell Company, Inc., 262 West Exchange Street, Providence, Rhode Island.

GRINNELL

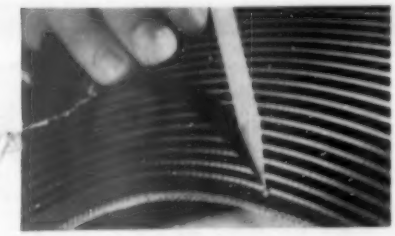
PROTECTION AGAINST
EVERY FIRE HAZARD

Manufacturing, Engineering and Installation of Automatic Sprinklers Since 1878

B.F.Goodrich

B. F. Goodrich belt grips better, saves space, lasts longer

WITH the Ribflex conveyor belt you can carry packages, bags, crates, all sorts of things at angles never possible before, and so make important savings in space, equipment and time. The Ribflex belt shown here climbs at a steep 45° angle, makes it possible to stack 42 sugar bags where only 30 were stacked with the previous belt.



It's the improved design with flexing ribs that gives this belt its nonslip, gripping action. Parallel ribs of rubber are cross cut into thousands of flexible grip blocks—more than 5,700 to the square foot. The tiny rubber blocks are tough enough to stand years of use, yet soft so they bend just enough to grip anything carried by the belt, and move it safely, surely. And since the belt has a self-cleaning action, there's no danger of it becoming clogged and ineffective.

The use of the flexing rib design means the belt will maintain its effective gripping action even after natural wear occurs, and tests prove this B. F. Goodrich belt will give at least 16% longer service life than any rough surface conveyor belt.

For help in selecting belts for any kind of service, we remind you that B.F.Goodrich distributors are specialists in rubber. Their job is to help you cut costs and get dependable service whether you're buying belting, hose, packing, matting, clothing—any industrial rubber product. *B. F. Goodrich Industrial Products Co., Dept. M-783, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

FACTORY | Guide fo

MANAGEMENT AND MAINTENANCE

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65TH YEAR OF PUBLICATION

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

FACTORY MANAGEMENT AND MAINTENANCE
NOVEMBER 1956 Vol. 114, No. 11
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November 1956

*Edited exclusively for the Plant Operating Group**

*Management men and engineers with operating responsibilities for Production, Maintenance, Plant Engineering, or Direction of People.

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FACTORY | LETTERS

THAT FELLOW FINNEGAN

Sir:

Your article on "Six Cues to Better Arbitration" (September 1956, p. 108) was a well-put-together one, but I do not agree with all those things that fellow Finnegan had to say.

Joseph F. Finnegan
Director, Federal Mediation & Conciliation Service
Washington 25, D.C.

WOMEN AGAIN

Sir:

We have a serious turnover problem with our female factory help. I feel that it may be partly due to lack of an adequate job training and orientation program on our part. Can you help us with reprints of articles on this subject?

G. M. Avalon
Director of Manufacturing
Permo, Inc.
Chicago 26

► You're just a little bit ahead of us. We are now conducting a survey on the general subject of women in industry and plan to publish an article within the next few months. Meanwhile we enclose (1) a reprint of an earlier FACTORY article, "How to Start a Training Program From Scratch" (price 35¢); and (2) tearsheets of three FACTORY articles: "Good Employee Relations in a Small Plant" (March 1953), "Labor Turnover and What to Do About It" (January 1953), and "Train Craftsmen in Basic Industrial Skills" (January 1952). We suggest also three books: Brown's "Ef-

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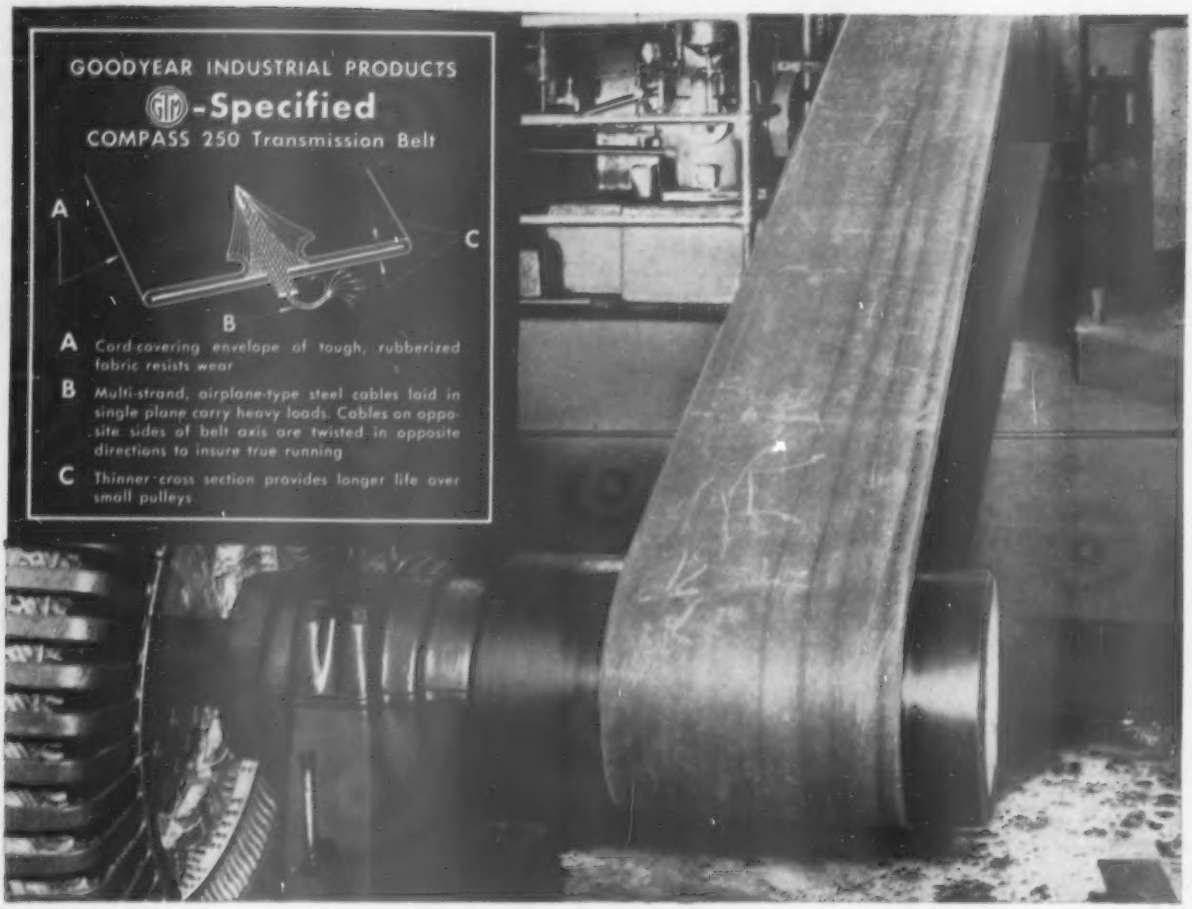

GOODYEAR INDUSTRIAL PRODUCTS
G-Specified
COMPASS 250 Transmission Belt
A
C
B
A Cord-covering envelope of tough, rubberized fabric resists wear
B Multi-strand, airplane-type steel cables laid in single plane carry heavy loads. Cables on opposite sides of belt axis are twisted in opposite directions to insure true running
C Thinner cross section provides longer life over small pulleys

Triples generator belt life *by consulting Goodyear Distributor-G.T.M. Team*

Ordinary belts continually stretched and slipped on the big, water-wheel-to-generator drive pictured above. Almost weekly take-ups and yearly replacement were standard operating procedure.

When asked his advice, the Goodyear Distributor recommended a COMPASS 250 Transmission Belt, sinewed with endless steel cables, for the job. *Result:* At last report, this super-belt was *still running after three years—had not required a single take-up — was saving about $100 per year in maintenance alone.*

Similar solutions to your equipment problems may well come from your Goodyear Distributor. You'll find his a willing and well-trained hand in the proper application of industrial rubber goods. And should he ever need help of a highly technical nature, he can always call on his teammate—the G.T.M.—Goodyear Technical Man.

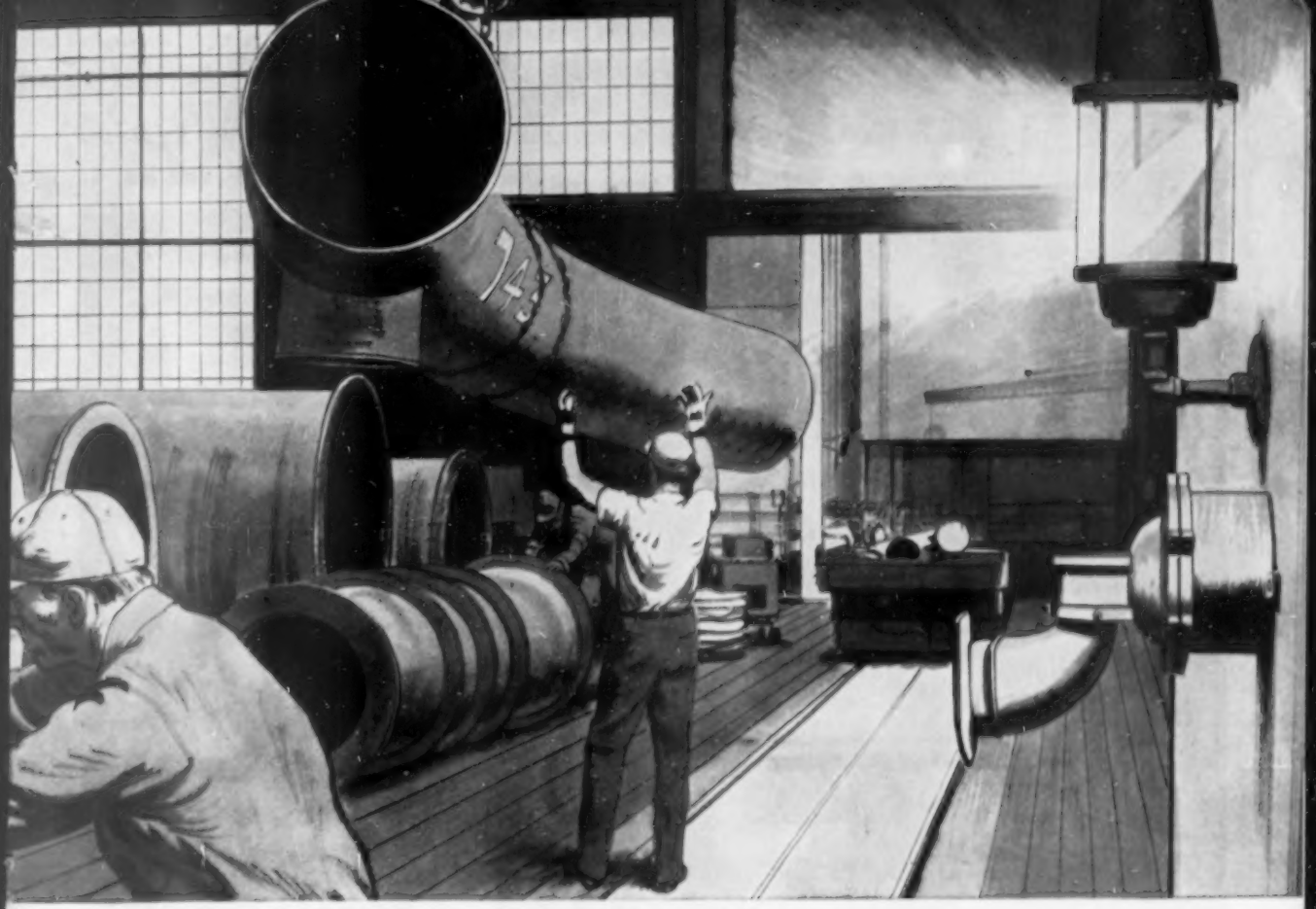
The next time you need help on Flat Belts, V-Belts, Hose or other industrial rubber, call your Goodyear Distributor. He's listed in the Yellow Pages of your telephone directory. Or write:

**Goodyear, Industrial Products Division,
Akron 16, Ohio.**

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



You may need audible and/or visual signaling facilities for paging or warning, or intercom for a dozen different industrial conditions. You, or your electrical contractor, can meet every signaling need by calling Graybar.

How to plan SIGNALING that will

LOCATE—WARN—PHONE

anyone, anywhere in the plant—or out

New construction, additions or modernization may confront you with signaling problems. *By calling Graybar first*, you'll get the facts on the newest and finest developments of such leaders as USI on sound powered telephone; Edwards code-paging and calling systems; Webster intercoms; Sperti Faraday annunciators and clocks, and Federal signals for every usual and specialized condition.

Calling Graybar enables you, or your electrical contractor, to fill *every single need from one single, convenient source.* Your Graybar Signaling Specialists make it their business to know the special advantages of all the latest equipment.

Remember, too, that Graybar distributes *everything electrical* for wiring, lighting, power and ventilation. 683-1111

Everyone who buys signaling equipment can use a copy of this free Signaling Selection Guide, produced by the Federal Sign and Signal Corporation. If you are located in the U. S. or possessions, write for your copy.

CALL **GraybaR** FIRST FOR

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THIS is a Metal Cleaning and Rust Proofing Machine

. . . it is part of a Complete Mahon Self-Housed Finishing System Installed in 1939 on the Roof of Maytag's Plant No. 1

Conventional Wringer Washer Produced by Maytag in 1939.

Today's Product: The Famous Maytag Wringer Washer Produced Today Receives its Fine, Durable Finish in the Same Finishing Equipment.

Partial View of Maytag's Plant No. 1. The Mahon Self-Housed Finishing System installed on the Roof in 1939 is clearly visible. Over a dozen other Mahon installations—including Two More Complete Finishing Systems—are today in operation in Maytag Plants.

. . . over 5,000,000

MAYTAG Conventional WRINGER WASHERS have PASSED THROUGH THIS FINISHING SYSTEM . . . and It is STILL in DAILY USE!

When you hear this statement: "Mahon equipment is engineered better and built better for more economical operation over a longer period of time", it is no idle boast. There are dozens of Mahon Finishing Systems in various industries throughout the country with performance records comparable to this one at Maytag. When you make a capital investment in equipment which so directly affects your production costs and the appearance and saleability of your product, your primary concern should be end results—quality of finish produced, operating efficiency, flexibility of equipment to handle future production loads and model changes, and yearly maintenance requirements—these are the all-important considerations. The lowest price tag doesn't tell the whole story . . . so, if you want good finishing equipment—equipment that is thoroughly engineered and coordinated to do a good finishing job, remember that you can only buy Mahon experience, Mahon engineering and Mahon quality equipment from Mahon. It may cost a little more, but Mahon customers will tell you that "It's the best investment you can make". See Sweet's Plant Engineering File for information, or write for Catalog A-657.

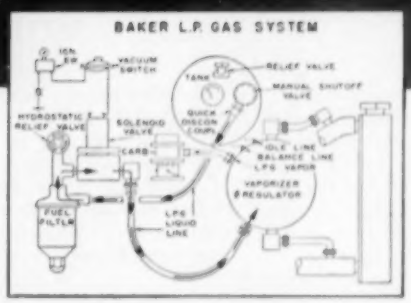
THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

BAKER *offers LP gas fork trucks in 2000 to 7000 lb. capacities*



Arrows trace the flow of LP gas from the tank through the filter to the vaporizer and regulator before it enters the engine. The hydrostatic relief valve opens the system before dangerous pressure is reached in event of high ambient temperature changes. Automatic fuel shut-off is provided by solenoid valve and vacuum switches when engine stops. For maximum efficiency, the vaporizer preheats the LP gas before it passes to the regulator and the regulator reduces the pressure before the gas enters the carburetor.

The complete Baker line includes the BAKER LP gas fork trucks for those desiring the cost savings, cleaner operation, and other advantages provided by liquefied petroleum gas.

The Baker LP gas truck is powered by an engine specially designed for LP gas, not just a conversion unit. The special LP engine is provided with high compression head for maximum efficiency. Among the features are a special cold manifold and hot thermostat for cooler operation. Stellite-faced exhaust valves and solid Stellite inserts assure greater dependability and longer life. Complete vaporization and more efficient combustion mean lower oil consumption, less down time and reduced maintenance costs due to minimum cylinder wear. Fuel tank conveniently located behind the driver can be removed and full tank installed in less than a minute.

Write for information.

THE BAKER-RAULANG COMPANY

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Baker handling equipment

A subsidiary of Otis Elevator Company

6G4A

If you can reach it, you can fasten it with *Ramset*®

One-hand operation in awkward places is simple with a light RAMSET powder-actuated tool. It's ideal for ladder and scaffold work.

For anchoring to concrete or steel, the new DUO-JOBMASTER® sets ¼" and ⅜" fasteners interchangeably—merely by switching barrels right on the job! Yet the tool does not change size or weight!

There's no need to exert physical power when you use RAMSET. Let the power charge do the work! No wires, no hose to drag or untangle. RAMSET is entirely self-contained.

Tough jobs are now easy with RAMSET. No more drilling, filling, plugging and bolting. RAMSET fasteners are set at the press of the trigger—have greater holding power than old-style methods.

Speed your production, make work easier for operators, cut your costs, get more dependable performance by using RAMSET whenever fastening to concrete, steel or other hard materials.

Write for free new catalog, ready for you now.

companion tool

Shure-Set
TRADEMARK

Baby brother to RAMSET, this hammer-in tool uses no cartridge, but makes your own hammer power more effective. For masonry, mortar joints, cinder block. Ask for literature.

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION

12155-K BEREA ROAD • CLEVELAND 11, OHIO

fective Supervision" (Macmillan), Perry's "Human Relations in Small Industry" (McGraw-Hill), and Baker's "Personnel Management in Small Plants" (Ohio State University)—ED.

CUTTING COSTS

Sir:

We are trying to establish a cost-reduction training program for the top management and supervision of our Maintenance Division. Goal: to convince management and supervision of the need for cost reduction and educate them in its fundamentals as applied to our maintenance functions. Is there any specific information that will help us with this?

D. G. Shaner
K. H. Dripps
Maintenance Engineering and Methods Department
Union Carbide Nuclear Company
Oak Ridge, Tenn.

► **We have never published an article on this specific topic. But we have had a great many on cost reduction, maintenance training, general maintenance management procedures. Some of these might be helpful: "How to Find and Control Maintenance Costs," March 1953 (reprints, 50¢); "What Should Maintenance Cost?" January 1953 (reprints, 50¢); "Cost Reduction Show," February 1954; "A-B-C Rating Charts," June 1954; "What to Do When the Boss Says 'Cut Costs'," September 1954—ED.**

JANITORS' STANDARDS

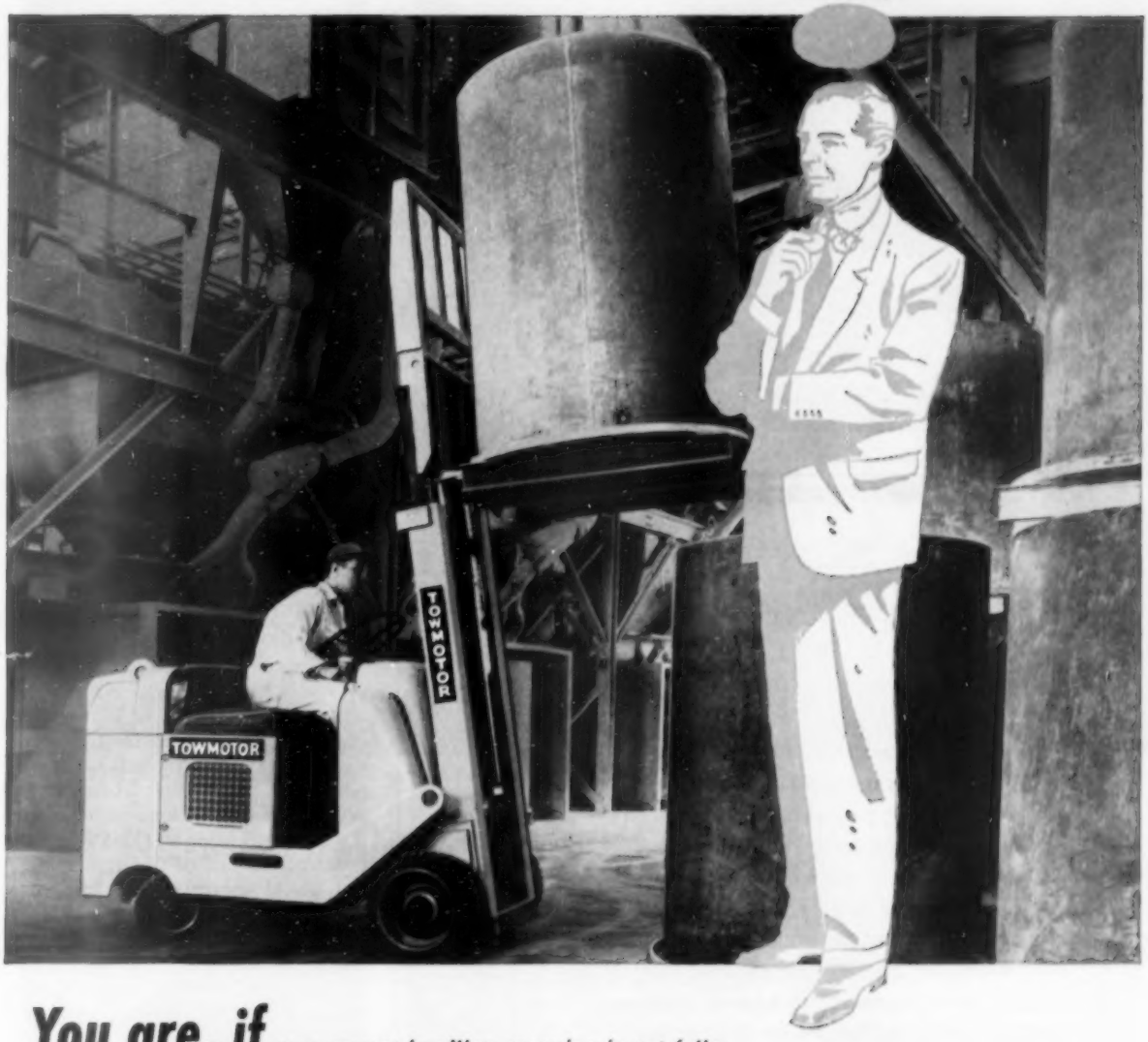
Sir:

We are trying to locate standard data on janitorial duties for the purpose of establishing labor standards. Can you help us?

R. I. Millard
AMC Systems Engineer, USAF
Memphis Air Force Depot
Memphis 2

► **Tear sheets enclosed of "Using Work Measurement to Cut Housekeeping Costs" (FACTORY, August 1953, p. 118), with supple-**

Am I ready for a Towmotor?



You are, if your present handling operation is *not* fully mechanized, and requires: **(1)** *3 or more full-time workmen.* **(2)** *Movement of heavy or bulky unit loads.*

In today's competitive market, you must step up your business operations with efficient handling methods. To discover how *your* firm can speed handling, eliminate "bottlenecks" in the flow of materials, and make maximum use of storage space, call your Towmotor representative today. He'll show you how to cut handling costs and open the door to *greater profit.* Write for certified Job Studies covering *your* industry. TOWMOTOR CORPORATION, Div. 511, 1226 E. 152nd St., Cleveland 10, Ohio.

Read how other companies use Towmotors to economize NOW!

Food: Ask for Job Study #101
Warehousing: Ask for Job Study #98
Transportation: Ask for Job Study #97
Newspaper: Ask for Job Study #96
Metal: Ask for Job Study #95

America's ***best engineered*** *fork lift truck*

TOWMOTOR
THE ONE-MAN-GANG

THERE'S ONLY ONE FORK LIFT TRUCK CALLED TOWMOTOR

TOOLING...

When you buy Acme-Gridley
you get SERVICE
ANYTIME, ANYWHERE

Tooling for *top* performance is a "must" in today's relentless battle to curb rising costs. Why not profit by performance facts already proved by many users of Acme-Gridley automatic bar and chucking machines.

Our engineers will help you select the tooling best suited to quantity output of new items, or check your present tooling setups against current practices in order to provide lowest production costs possible.

National Acme

The NAMCO nameplate on your machine assures service — in emergency or normal situations — when and where you need it.

THE NATIONAL ACME COMPANY • 167 East 131st Street, Cleveland 8, Ohio

mentary set of standard times. Also, we suggest the following sources: "Buildings Management Technical Standards for Cleaning Office Buildings" (General Services Administration, Washington 25, 1952), "Custodial Service Repairs and Utilities" (Technical Manual 5-609, Superintendent of Documents, Government Printing Office, Washington 25), "Lowering Costs in Floor Cleaning" (Industrial Sanitation Counselors, Louisville, Ky.), "Service Bulletin No. 28" (National Association of Buildings Owners and Managers, Chicago 3), and "Handbook for Janitorial Service" (University of Illinois, Chicago). And you might write to Industrial Sanitation Counselors, Louisville, Ky., for a review of its program for improving sanitation operations throughout industry—ED.

SHORTEST DISTANCE

Sir:

I've read with interest your comprehensive article on operations research (September 1953). One part struck me as a clue to the solution of a problem I am now encountering: a statement that says, in effect, that OR can solve the shortest total distance traveled on scheduled material flow. This sounds like a linear programming problem, though in my meager reading on OR I've never come across one of this type.

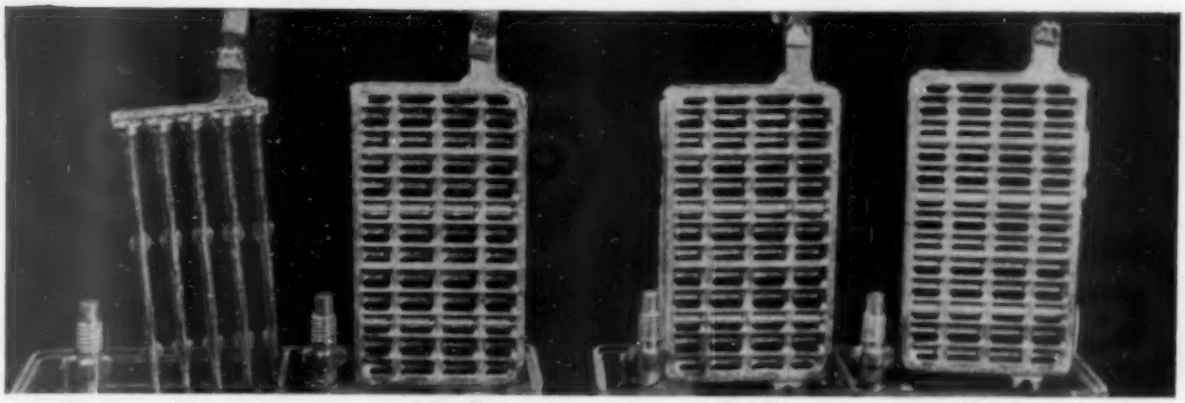
I would appreciate any help you can give in this problem.

J. H. Hildwine
Industrial Engineer
Management Services Department
Philadelphia Gas Works
Philadelphia 22

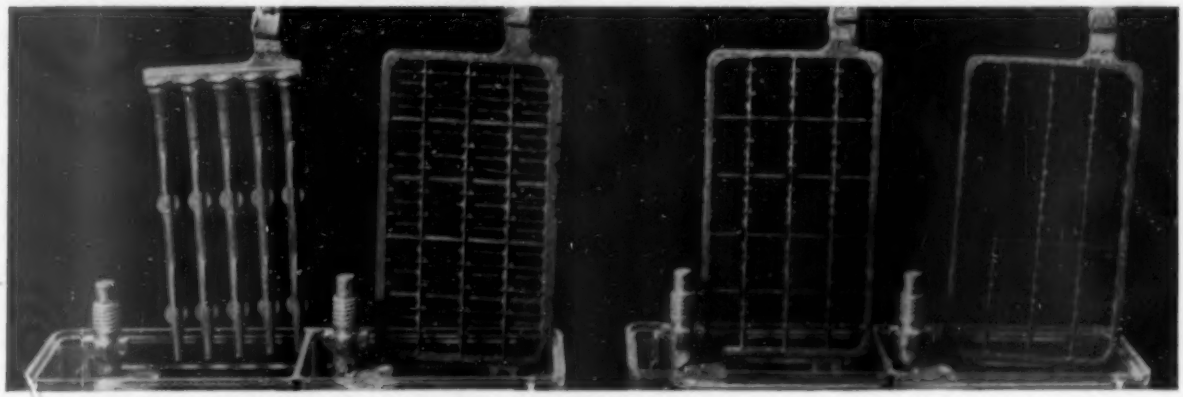
► **Certain work has been done that borders on your problem. Most of it has involved minimizing shipping costs from various plants to various warehouses around the country, (FACTORY, April 1956, p. 68). For further information on this particular problem, write to Ed Jacobs, General Foods Corporation, White Plains, N.Y. Another industrial engineer who has worked on this kind of problem is J. M. Allderidge, Eastman Kodak Company, Kodak**

EXIDE-IRONCLAD BATTERIES

For electric industrial truck operation



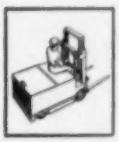
BEFORE: Silvium alloy — Alloy "A" — Alloy "B" — Alloy "C"



AFTER: Note how the Silvium grid resisted corrosion. Compare it with the other alloys.

Corrosion resistant SILVIUM prolongs battery life

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK, Model TH. Fits snugly into space provided on truck. Has tubular construction of positive plates, Silvium grids, "Permanized" negative plates, extra heavy connectors and all other Exide-Ironclad advantages that mean power to spare in heavy duty applications. Write for Bulletin 5161.



Reaching down deep into every Exide-Ironclad Battery are the fingers of Silvium alloy metal which form the grids of the famous Exide-Ironclad positive plates.

Silvium is a special alloy developed by Exide to resist corrosion and thus prolong battery life. For proof, Exide research engineers compared the performance of an Ironclad Silvium grid side by side with ordinary grids of other lead alloys. As the photographs above show, only Silvium came through the test without damaging corrosion—undiminished in size, unimpaired in strength. The other grids showed from moderate to severe corrosion.

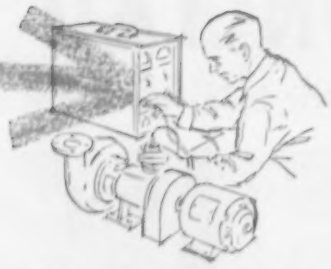
Tests have proved that Silvium is not only more resistant to corrosion, but also a better conductor of electricity. Hence it both prolongs battery life and —because there's less internal battery resistance—more readily permits heavy drafts of power.

This special material is only one of the many exclusive features which have made Exide-Ironclad Batteries world famous for high capacity and long life. When you order batteries for heavy duty applications, or the equipment requiring such batteries, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

Exide®

3

WAYS YOUR COMPANY CAN BENEFIT using portable IRD vibration analyzers



CHECKS MACHINERY OPERATION AND CONDITION — measures permissible vibration and balance tolerances.

FAST TROUBLESHOOTING — quickly pinpoints part causing vibration.

DYNAMICALLY BALANCES, "IN-PLACE" — without costly tear-down.

No matter what your product or process, IRD vibration analyzing and portable balancing equipment can help you make it better . . . and at less cost.

Hundreds of manufacturers are utilizing IRD vibration analyzing equipment as a fundamental in their plant programs to attain greater production precision, efficiency and quality on machine tools; smoother operation and longer life on pumps, motors, blowers, generators, gyros and all types of rotating equipment.

Write today for an *in-your-plant* demonstration

Perhaps you have machinery that's operating a bit rough, right now. We'd be happy to have an IRD Sales Engineer demonstrate on your equipment. Just write or phone. No obligation of course.

IRD vibration analyzers

International Research and Development Corp | 804 thomas lane, columbus, ohio

Begins on page 3

Park Works, Rochester, N.Y. We'd also suggest R. O. Ferguson, Vice President, Methods Engineering Council, Pittsburgh 21—ED.

HURRICANE WARNING

Sir:

"Now's the Time to Prepare for Hurricanes" (FACTORY, August 1956, p. 84) provides valuable stimulation and guidance in preparing for natural disasters in industry. The article is of special value in connection with the National Industrial Survival program. It is another example of your fine cooperation in contributing information of vital national importance. . . . As you know, preparation for natural disasters is an important part of the over-all Civil Defense program. It will contribute much to CD readiness for H-bomb attack and increase our chances of survival.

Your excellent publication "What to Do After the Flood" has been effectively used by state and local Civil Defense officials throughout the nation in providing encouragement and guidance to industry in natural disaster preparedness.

May we have your permission to reprint "Now's the Time to Prepare for Hurricanes"? We would like to distribute copies to certain Civil Defense officials and industrial executives to encourage preparation for all natural disasters. Of course, full credit will be given to FACTORY.

Again, thanks for taking the leadership in providing well-written and well-presented information in the national interest.

V. L. Couch
Director, Industry Office
Federal Civil Defense
Administration
Battle Creek, Mich.

► **Permission granted. (Under special circumstances, FACTORY may grant permission for someone else to reprint articles. Details upon inquiry to The Editor.) For companies and individuals who want reprints of the hurricane articles, we have reprints on hand (price, 50¢ each). And we have a few copies left of "What to Do After the Flood"**

SAVE SPACE—Using ELPAR high lift trucks, a foundry devised a special core handling system that *doubled effective use of their storage area.* Trucks speedily high tier racks of fragile cores without damaging them.

SAVE STOCK—Using ELPAR roll clamp trucks, corrugated box maker has *reduced paper damage to almost zero.* Unique ELPAR clamp handles rolls from 51" in diameter down to small butt rolls without manual adjustment.

SAVE

WITH ELPAR TRUCKS

66% of the 75 largest U. S. manufacturers use ELPAR trucks because their savings soon repay the truck investment. *You can save, too!* Write for complete ELPAR catalog.

THE ELWELL-PARKER ELECTRIC CO.
4030 St. Clair Avenue • Cleveland 3, Ohio

SAVE DOWNTIME—"Split-second" deliveries to their automated assembly line are a must at Studebaker-Packard. Built-in dependability of ELPAR trucks keeps them always on the job, preventing costly bottlenecks.

SAVE MONEY—Salt refiner finds rugged ELPAR construction plus easy preventive maintenance cut operating cost. Surveys prove electric trucks operate for at least 50% less than gas trucks.

"Keeps our equipment cleaner for less cost..." MORTON SALT

Malsbary 51 fireless steam cleaner, using heat and pressure from regular steam lines, knocks corrosive salt from tablet-making machine.

Malsbary FIRELESS steam cleaner

...beats costly corrosion, improves product quality

Morton Salt ("when it rains it pours") Rittman, Ohio formerly cleaned tablet machines, fork lifts and floors by hand, using soap, water and air. Before cleaning, tablet machines are covered with highly corrosive salt in addition to usual oil and grease. Hand cleaning was slow, ineffective, left corrosion-starting moisture.

Then Morton Salt switched to a Malsbary Model 51 fireless steam cleaner. Its hot cleansing stream gets into corners and crevices you can't reach by hand. The heat causes quick drying without moisture, leaves machines spotless, safeguards public health, by assuring sanitary conditions.

Model 51 also cleans fork lift trucks and floors.

"Reduced Maintenance Costs"

Besides improving plant sanitation, the Malsbary 51 fireless cleaner shortens cleaning time, cuts repair costs both for parts and labor, prolongs tablet machine life. Writes H. S. Squibbs, plant manager:

"We are able to keep our equipment cleaner for less money; have reduced maintenance costs and improved quality."

Malsbary makes only complete line

Malsbary Model 51 fireless cleaner gets its heat and pressure from your plant's regular steam lines, delivers up to 200 gph. at pressures to 100 psi. Other Malsbary models: 60 to 2100 gph. and 60 to 400 psi. Stationary, caster, trailer or tricycle mounting. All are designed to eliminate smoke, soot and eye-irritating fumes, so they can be used in confined areas. All enable you to sterilize and deodorize as you clean.

You, too, can keep equipment cleaner at less cost with Malsbary steam cleaners. Call your nearest Malsbary dealer now for details, or write us for free literature.

98

MALSBARY MANUFACTURING CO. SINCE 1921

Room E11, 845 92nd Ave. Oakland 3, Calif.

(price, 25¢ each). Address Reader Service Dept., FACTORY, 330 W. 42nd St., New York 36—ED.

CRAFT TRAINING

Sir:

I have seen a letter from one of your subscribers (FACTORY, June 1956, p. 14) with reference to training craftsmen; also other inquiries about training. Either you are unaware of the work of our agency, or the matter of training for the skilled crafts in this country has not been brought to your attention recently. Our agency has offices in principal cities throughout the nation. Or a representative will call on any establishment if the inquiry is directed to the Bureau of Apprenticeship, 14th and Constitution Aves., Washington 25. Sometimes a look in the telephone book will be enough. We welcome all inquiries. There is no charge to management or labor for our services.

William C. Webb
State Liaison Representative
Bureau of Apprenticeship
U. S. Department of Labor
Columbus, Ohio

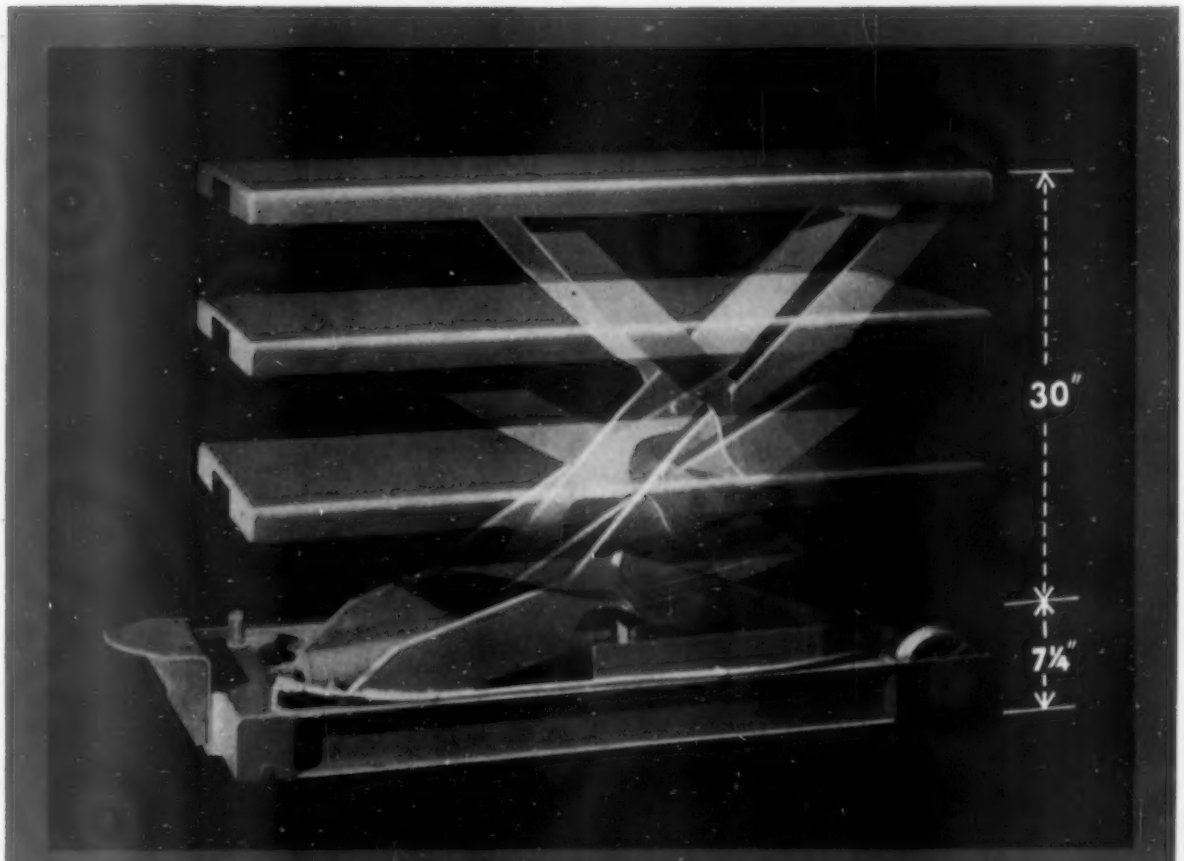
TOP SECRET

Sir:

We have just seen "More for Your Electrical Dollar" (FACTORY, July 1956, p. 102), a survey of electrical services at 42 major industrial plants in Toledo. It looks like a thorough and competent job. . . . If the matter is not in confidence we wonder if—for our own use only—we could have the names corresponding to the numbers of the 42 plants.

W. H. Steinhauer
Manager, Power Sales Department
Toledo Edison Company, Toledo

► **Thanks for your kind words. We regret we cannot provide names. We obtained much information from Toledo executives under the provision that we would reveal nothing that would identify any plant with any facts or figures. We feel we should stick with that—ED.**



THE NEW PORTABLE SOUTHWORTH LIFT TABLE

WHATEVER WORKING HEIGHT YOU WANT WHEN AND WHERE YOU WANT IT

■ In industry after industry, the Southworth Lift Table is cutting handling costs by providing an easy way of elevating skid or palletized loads to a correct working height for machine, process or assembly operations. The required lift may be in one stage from skid level to an established working level, as with dies, castings and fixtures. Or it may entail frequent adjustment of stock height, as in sheet feeding, sorting and inspection. Either way, the lift desired is a mere matter of simple switch control, with free access to the load by the operator from all angles at all times. In addition, this new Lift Table may be easily *relocated* by means of a detachable skid spotter or dolly . . . serving as a loading lift in conveyor systems, a power-levelling ramp eliminator, or a work positioner of multiple applications.

SPECIFICATIONS

Capacity	4000 lbs.
Platform	24" x 53"
Collapsed Height	7¼"
Extended Height	37¼"
Controls	Foot or Hand
Motor	½ h.p. single phase 115 volt AC 60 cycle 1725 rpm.
Pump	electro-hydraulic

Other stationary and portable models available in a number of table sizes and capacities.

For Further Details Write:

SOUTHWORTH MACHINE CO.

3411 WARREN AVENUE, PORTLAND, MAINE

Manufacturers of Paper Conditioners; Automatic Skid Lifts; Skid Turners; Hand, Foot, Motor Driven Punching Machines; Humidifiers; Envelope Presses; Punch Heads; Tabbing Knives and Corner Cutters plus Custom Built Equipment.

ELIMINATE FATIGUE • REDUCE HANDLING TIME • INCREASE PRODUCTION

in the air moving and conditioning field—

AMCA* HELPS *YOU* DO YOUR JOB *BETTER!*

If you are an architect, consulting engineer, building contractor, or plant engineer—if you are in any way concerned with the design, installation, or maintenance of air moving and conditioning systems—AMCA is now helping you to do your job better.

* *what is AMCA?*

AMCA, the Air Moving and Conditioning Association, Inc., is a non-profit trade association formed this year, in the service of industry and the public, by the merger of three predecessor organizations.

* *who comprises AMCA?*

Fifty-one leading manufacturers of air moving and conditioning equipment have joined to form AMCA. Member companies manufacture products falling within one or more of the Association's major product divisions: Centrifugal Fans; Industrial Axial and Propeller Fans; Central Station Air Conditioning units; Power Roof Ventilators; Unit Heaters; and Residential Fans.

* *how AMCA benefits you*

The activities of AMCA benefit you in many ways, both directly and indirectly. Here are a few:

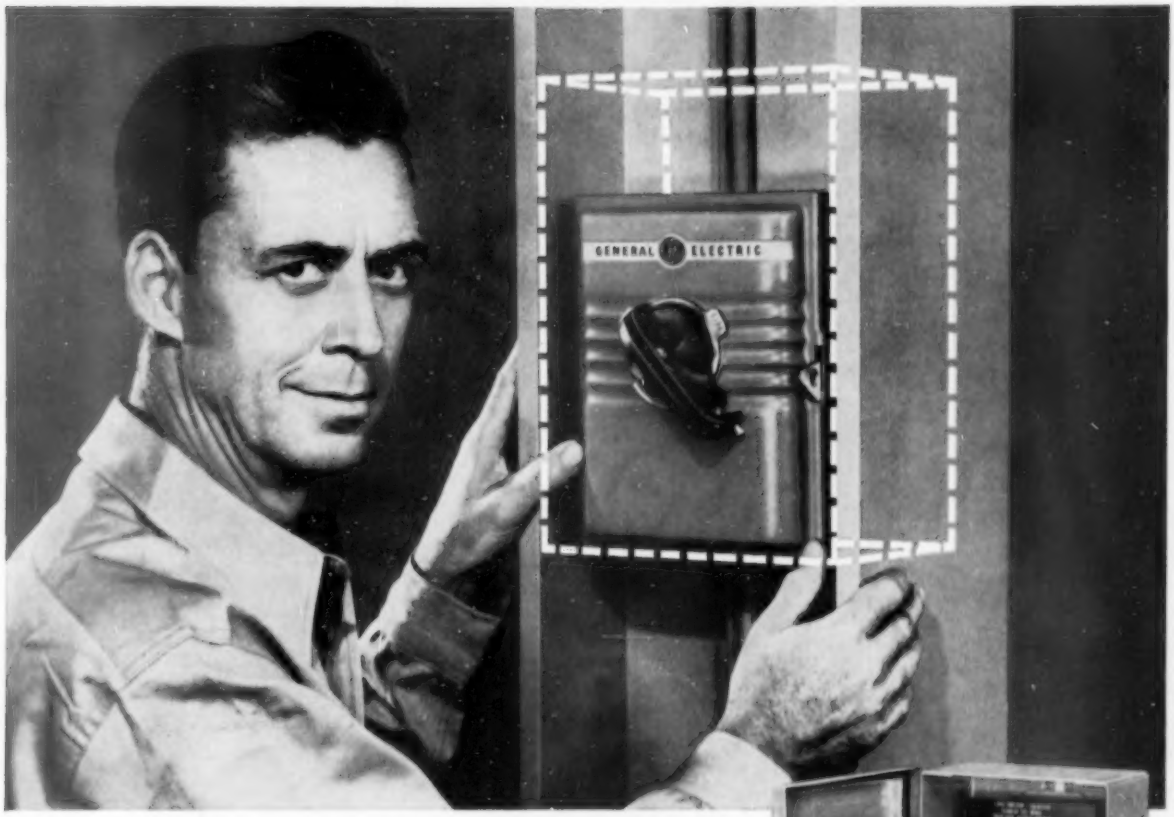
1. AMCA compiles and makes available to you technical information relating to air movement, heating and cooling.
2. To protect you, AMCA establishes and promotes the use of standards for equipment performance and testing methods.
3. AMCA conducts exploratory research on basic industry problems to improve the products and methods you will use.
4. AMCA functions as a clearing house for all industry activities and stimulates the exchange and dissemination of ideas.
5. AMCA maintains close liaison with public agencies, serving as spokesman on matters regarding the industry.

AIR MOVING & CONDITIONING ASSOCIATION, INC.

2159 GUARDIAN BUILDING DETROIT 26, MICHIGAN

MEMBER COMPANIES

Acme Equipment Company
Aerovent Fan Company, Inc.
Air Controls, Inc. Division, Cleveland Heater Company
Airtherm Manufacturing Company
Aladdin Heating Corporation
Allen Cooler & Ventilator, Inc.
American Air Filter Co., Inc.
American Blower Corporation
American Coolair Corporation
American Steel Band Company
Bar-Brook Manufacturing Co., Inc.
Bayley Blower Company
The Bishop & Babcock Manufacturing Co., Massachusetts Blower Division
Buffalo Forge Company
Burt Manufacturing Company
Carnes Corporation
Carrier Corporation
Century Fan & Ventilator Company
Chelsea Fan & Blower Company, Division Chelsea Products, Inc.
Chicago Blower Corporation
Clarage Fan Company
Davidson Fan Company
De Bothezat Fans Division, American Machine & Metals, Inc.
Fedders-Quigan Corporation
The Gallaher Company
Garden City Fan Company
General Blower Company
The Green Fuel Economizer Co., Inc.
Grinnell Company, Inc.
Hartzell Propeller Fan Company, Division Castle Hills Corporation
Hirschman-Pohle Company
Hunter Fan & Ventilating Co., Inc.
Ilg Electric Ventilating Company
International Engineering, Inc.
Kennard Corporation
McCord Corporation
Modine Manufacturing Company
D. J. Murray Manufacturing Co.
John J. Nesbitt, Inc.
The New York Blower Company
Peerless Electric Company
Penn Ventilator Company
Propellair Division, Robbins & Myers, Inc.
Reed Unit-Fans, Inc.
The Swartwout Company
The Trane Company
Utility Fan Corporation
Viking Air Products Division, National U. S. Radiator Corporation
Westinghouse Electric Corporation, Sturtevant Division
L. J. Wing Manufacturing Co.
Young Radiator Company



Now you need only half the former space with General Electric's new 30 amp, 600 volt HCI safety switch!

This HCI safety switch, both heavy and standard duty, has a new compact design measuring only 7⅜" wide x 9⅜" high x 5⅜" deep! In less than half the former space, you get the same dependable protection and these important benefits:

Long life, dependable performance. G-E arc quenchers quickly divide and snuff out arcs, help prevent pitting and burning of contacts. Heavy steel box has Bonderite† corrosion-resistant finish and butt-hinged door for rugged durability.

Speedy installation and maintenance. Front operated handle makes close ganging easy with the heavy duty model; front fusing on both models means fast access to fuses, efficient heat dispersal. Double-break HCI pole units can be individually replaced.

Better protection, greater safety. Quick-make, quick-break contacts can't be teased in or out. Switch handle locks OFF or ON. When switch door is open, special line shield on heavy duty model guards operator against accidental contact with live parts. *General Electric Company, Circuit Protective Devices Department, Plainville, Conn.*

Use these catalog numbers to order 30 amp, 600 volt HCI switches from your G-E Distributor:

Type H, heavy duty, front operated, 3 pole*		Type S, standard duty, side operated, 3 pole*	
Fusible	No fuse	Fusible	No fuse
TC90361SD	TC45361SD	TC60361	TC30361

†Parker Rust Proof Co.

*UL listed

GENERAL ELECTRIC

VOLTAGE STABILIZING TRANSFORMERS

Here's how to stop voltage fluctuation from stealing your production dollars

Voltage fluctuation is one of the major causes of production losses; this often shows up in overheated or burned-out motors, relays dropping out, motors running at varying speeds, high scrap losses, excessive tool breakage and costly down-time. Standard General Electric voltage stabilizing transformers can correct these faults—fast—economically. Either install these transformers on your line or specify them in the automated equipment you buy.

Consider what happens when voltage isn't stable: voltage fluctuation, for example, can cause a key machine to operate improperly—scrap loss goes up. With General Electric voltage stabilizing transformers on the line, relays will not drop out—even when voltage is reduced by as much as 75% of rated line voltage.

More, General Electric voltage stabilizing transformers provide automatic, economical stabilization—no controls to set—no tubes to break or lose efficiency.

What does this all point to? Just this: right now you may be sustaining losses due to fluctuating voltage, and that's why you should investigate General Electric voltage stabilizing transformers—transformers built to traditional high G-E standards.

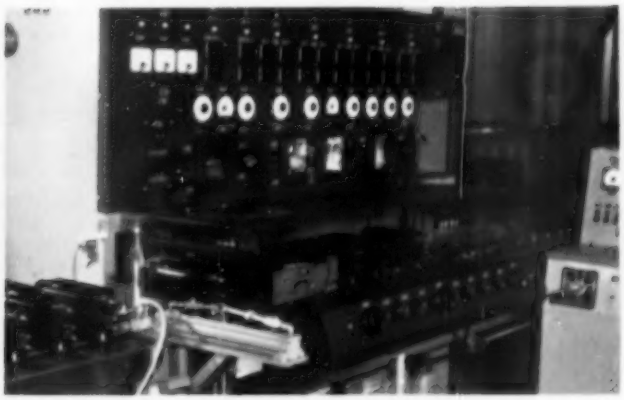
These units are available for single- or 3-phase power, or where harmonic filtering is required. If you are planning, engaged in, or responsible for an operation requiring production continuity, you need more information on how these G-E voltage stabilizing transformers can meet your specific needs.

Call your General Electric Apparatus Sales Office or distributor. Or send for descriptive bulletin GED-2987 to Section 410-33, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

The Boonton Radio Corporation of Boonton, N. J. uses G-E voltage stabilizing transformers in their Q meters, signal generators and univerters to stabilize voltage for precise metering applications.



Two G-E voltage stabilizing transformers are used in this machine which performs a series of automatic tests on a high volume production line. One keeps test voltage within test limits; the other sets limits of acceptability in the meter sensing circuit.

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS

You can "measure" the light output of G-E fluorescent lamps, *right in the carton!*

GENERAL ELECTRIC UNIFORMITY IS WHY—G-E 40-watt fluorescent lamps give you all the light you pay for. Their light output is so uniform that you're assured of their performance—even before you put one in a socket. There's practically no such thing as a "lazy" G-E lamp—a lamp that uses full power without delivering its rated lumen output. Less than 1% of all General Electric 40-watt fluorescent lamps are as much as 5% below their average published light output of 2500 lumens.

G-E LAMPS SAVE YOU MONEY—Today's General Electric 40-watt fluorescent lamps deliver 30% *more* light than those you bought in 1950. Based on the average cost of burning 24 G-E 40-watt fluorescent lamps, this gives you a *bonus of light* worth almost $55! Put another way, this *extra* light equals the total light output of 79 100-watt incandescent bulbs over their entire life!

But G-E lamp uniformity means more than uniform *light* output. It also means freedom from defects—on the average, 99.9% of all G-E 40-watt fluorescent lamps are free from physical defects that could affect performance in service. And uniform life, too, means that after one year of service in single shift plants (2500 hours) an average of 99 out of 100 General Electric 40-watt fluorescent lamps will still be burning—98 out of 100 will still be in service after a year in double shift plants (4000 hours).

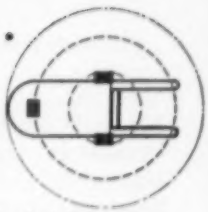
For more information on what uniformity in G-E fluorescent lamps means to you write: General Electric Co., Large Lamp Dept. FM-11, Nela Park, Cleveland 12, O.

Progress Is Our Most Important Product

GENERAL ELECTRIC

This rear-drive L-S electric truck saves 12" of aisle space...

TURNS IN ITS OWN LENGTH!

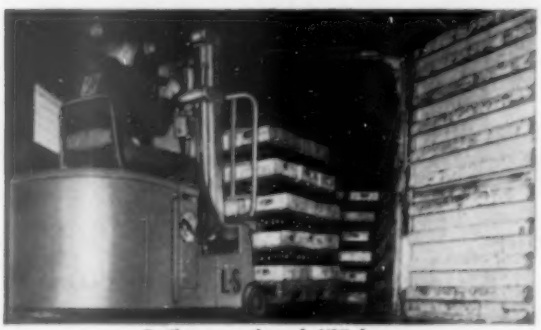


Lewis-Shepard Model "J", with rear-wheel drive, pivots at exact center of load wheel axle . . . actually, *turns in its own length!* This feature alone saves 5" of aisle space.

But there are other advantages. Because of rear-wheel drive, there's no differential up forward. This permits the mast to be mounted directly over the front axle. With the mast so positioned, it is never necessary to counter-weight the mast itself, making further reductions in truck length possible. Low and compact, L-S Model "J" is the shortest by far of all fork trucks. It saves up to 12" of aisle space; easily permits operator's head to clear 6'0" doors with operator in upright sitting position. It even operates comfortably *inside* trailer trucks.

You'll experience less downtime, more work time . . . with the sturdy, dependable, all-electric Lewis-Shepard Model "J". Capacities 1000 lbs.; 1500 lbs.; 2000 lbs.; and 2500 lbs. Catalog #33 gives all the details. Mail coupon requesting your copy. Get the facts without delay.

VISIT LEWIS-SHEPARD IN CLEVELAND JUNE 5-8 *at the* MATERIALS HANDLING EXPOSITION • BOOTHS 1012 and 228



Easily passes through 6'0" doors

MULTIPLY MANPOWER · LEWIS-SHEPARD

The "MASTER" Line

LEWIS-SHEPARD

1511 Walnut St., Watertown 72, Mass.

☐ Send me L-S Catalog 33

☐ Send me L-S Master Line Catalog

Name_____

Title_____

Company_____

Address_____

WHICH ONE

...for the safety of your installation?

Yes, both are rigid steel electrical conduit—but that's where the similarity ends! The National Electric Sherarduct conduit (on the left) is different in one vital way—it is lifetime protected by the unique Sherardizing process of dry galvanizing which actually alloys pure corrosion-proof zinc to the steel walls—threads and all. That's why you'll never see Sherarduct deteriorate like ordinary conduit (on the right). For thousands of structures, this Sherarduct protection has meant conduit life way beyond the life of the building.

A Sherarduct installation is the true mark of a quality wiring job. It means positive protection of the electrical system with no costly conduit replacements due to corrosion.

Remember these factors—and what they can mean to your installation. Make sure NE Sherarduct is specified for your job.

Sherardizing is Galvanizing at its Best!

Sherarduct is Galvanized Conduit at its Best!

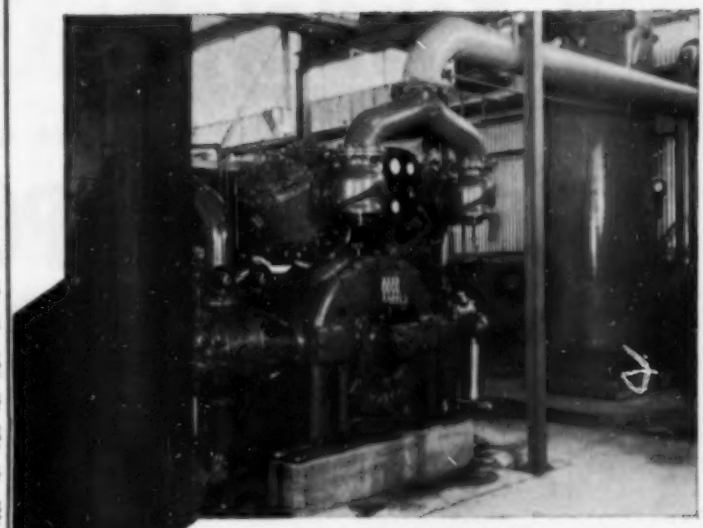
National Electric Products

PITTSBURGH, PA.

3 Plants • 10 Warehouses • 36 Sales Offices

CYLINDER AND LINER

CROSSHEAD GUIDE



JOY WN-114 heavy-duty, two-stage, double-acting compressor. Capacity 1186 to 1948 CFM, 125 psi.

You get a free "Insurance Policy" with the JOY WN-114 Compressor

Joy's replaceable cylinder liners and crosshead guides are your "Insurance Policy" against down-time and lost production. They eliminate reboring . . . a replacement liner can be installed quickly and easily by your regular maintenance personnel. The liner itself is made of a special iron alloy, honed to a surface smoothness of four micro-inches.

Joy WN-114 compressors have full force-feed lubrication to all friction-bearing surfaces. The compact, semi-radial cylinder arrangement and exact crankshaft counterweighting give proper balance . . . eliminate vibration wear and tear. Joy "Dual Cushion" valves run quietly without valve shock . . . have extra large air passages to minimize air friction.

These features are built into every Joy heavy-duty compressor, whether for continuous service at standard plant pressures, high or low pressures, or vacuum pump applications. Be 'insured' against air power interruptions . . . for more information write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pennsylvania.*** In Canada, *Joy Manufacturing Company, (Canada) Galt, Ontario.*

Send for free bulletin *126-12.*

Consult a Joy Engineer

For Air and Gas Compressors, Oxygen and Nitrogen Generators, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors, Hydraulic Fittings and Hose Assemblies.

WSW-1 8201-126

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

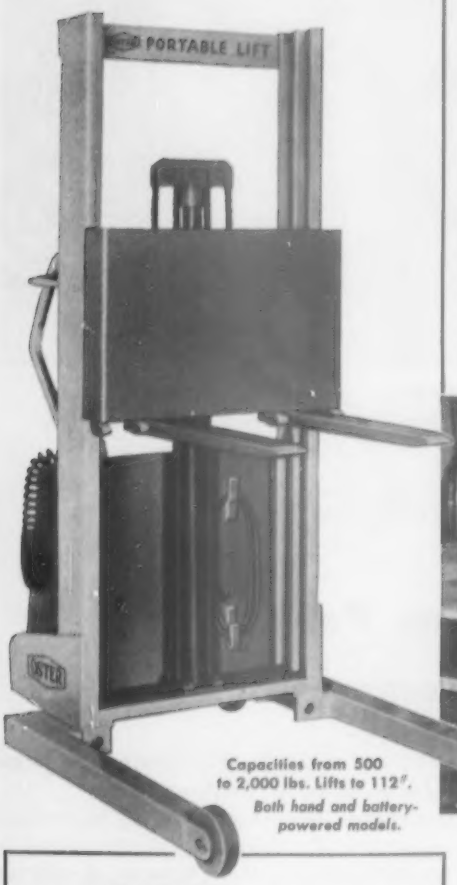
OSTER

...an Old Dependable Name with a New Dependable Product!

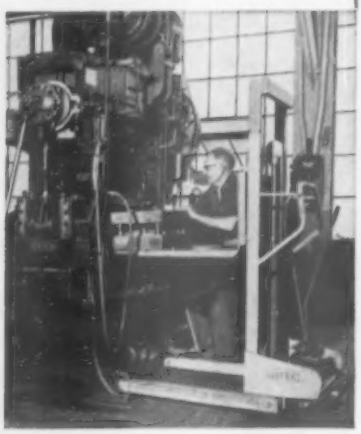
PRESENTS A COMPLETE NEW LINE OF

PORTABLE HYDRAULIC LIFTS

for stacking, unloading, machine set-up overhead maintenance, and faster handling of work in process!



Capacities from 500 to 2,000 lbs. Lifts to 112". *Both hand and battery-powered models.*



ONLY OSTER OFFERS YOU ALL OF THESE IMPORTANT FEATURES

1. FOUR CARRIERS IN ONE

. . . every Oster Lift can be used as a platform truck, straddle fork truck, portable elevator and shop crane.

2. SWING-TYPE SUPPORT LEGS

. . . an exclusive Oster feature in 1000 and 2000 lb. models . . . converts the Oster Lift from a standard platform lift to a straddle-type pallet truck in a matter of seconds.

3. OPTIONAL POWER UNIT

. . . complete 12-volt packaged unit, with built-in battery charger, available either as original equipment or as an accessory for conversion of hand-operated models. A remote control push-button station is standard equipment.

4. STRENGTH WHERE IT COUNTS

. . . carriage backplate made of special heavy-gage weldment. In large-capacity models, rugged masts further reinforced with center rail of high-quality steel.

5. FLOW CONTROL VALVE

. . . controls speed of carriage descent. Used with special high pressure tubing, valve assures positive protection against free fall of load.

OSTER 1,000-LB. LIFT DOES DOUBLE DUTY AT WESTINGHOUSE PLANT, LIMA, OHIO

STEEL COILS, weighing 275 lbs., are handled three at a time by the lift during delivery from storage to the feeding spindle. Here, the lift eliminates the need for manual effort in positioning a coil on the spindle.

PROGRESSIVE TYPE DIES, some four feet in length and weighing up to a half-ton, are moved by the Oster lift from storage to the presses. On arrival at the press, the lift platform is adjusted to press bed height and the die easily inserted into position.

Already tested and proved by many years of research and service in both small and large plants, these new Oster Portable Lifts offer a combination of design and safety features which are not available in comparable types of lift equipment.

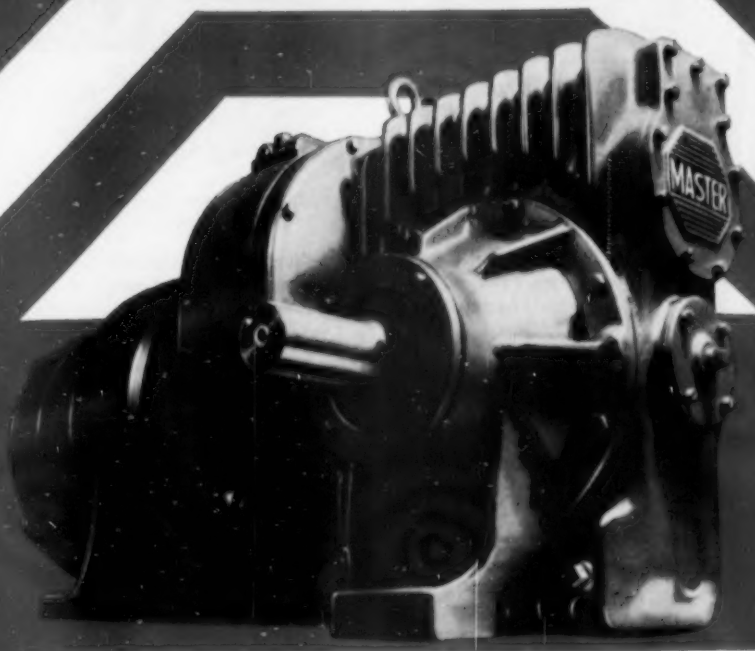
Get complete details, prices and specifications from your nearby Oster Lift Distributor, or write to our main offices for full information and the name of your nearest distributor.

THE OSTER MANUFACTURING CO.
Material Handling Division
1339 EAST 289th STREET, WICKLIFFE (CLEVELAND), OHIO

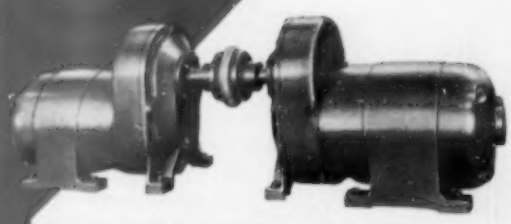
MASTER

still the All-American First

Master Gearmotors have given more millions of hours of satisfactory service in the field than all other makes combined.



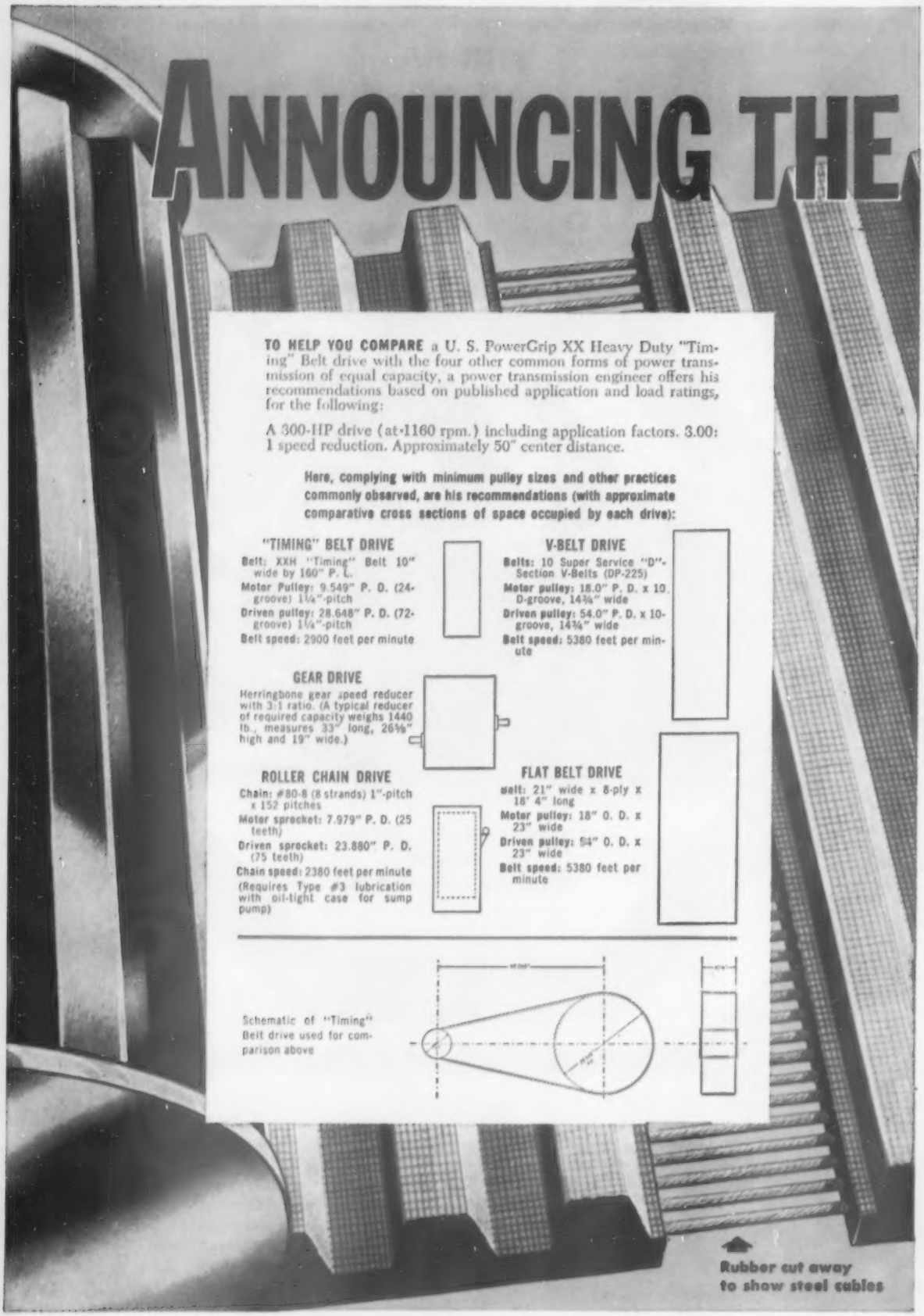
CONTINUOUS LIFE TESTING
MAINTAINS
CUSTOMER SATISFACTION



How can *we* help YOU?

For five years without stopping, these two 326 frame single reduction gearmotors were run continuously 24 hours a day at full load, one as an induction generator, the other as a gearmotor. When shut down and inspected, Master's conservative design showed *gear wear of less* than .001".

THE MASTER ELECTRIC COMPANY • Dayton 1, Ohio



TO HELP YOU COMPARE a U. S. PowerGrip XX Heavy Duty "Timing" Belt drive with the four other common forms of power transmission of equal capacity, a power transmission engineer offers his recommendations based on published application and load ratings, for the following:

A 300-HP drive (at 1160 rpm.) including application factors. 3.00: 1 speed reduction. Approximately 50" center distance.

Here, complying with minimum pulley sizes and other practices commonly observed, are his recommendations (with approximate comparative cross sections of space occupied by each drive):

"TIMING" BELT DRIVE

Belt: XXH "Timing" Belt 10" wide by 160" P. L.
Motor Pulley: 9.549" P. D. (24-groove) 1¼"-pitch
Driven pulley: 28.648" P. D. (72-groove) 1¼"-pitch
Belt speed: 2900 feet per minute

V-BELT DRIVE

Belts: 10 Super Service "D"-Section V-Belts (DP-225)
Motor pulley: 18.0" P. D. x 10 D-groove, 14¾" wide
Driven pulley: 54.0" P. D. x 10-groove, 14¾" wide
Belt speed: 5380 feet per minute

GEAR DRIVE

Herringbone gear speed reducer with 3:1 ratio. (A typical reducer of required capacity weighs 1440 lb., measures 33" long, 26⅝" high and 19" wide.)

ROLLER CHAIN DRIVE

Chain: #80-8 (8 strands) 1"-pitch x 152 pitches
Motor sprocket: 7.979" P. D. (25 teeth)
Driven sprocket: 23.880" P. D. (75 teeth)
Chain speed: 2380 feet per minute
(Requires Type #3 lubrication with oil-tight case for sump pump)

FLAT BELT DRIVE

Belt: 21" wide x 8-ply x 18' 4" long
Motor pulley: 18" O. D. x 23" wide
Driven pulley: 54" O. D. x 23" wide
Belt speed: 5380 feet per minute

Schematic of "Timing" Belt drive used for comparison above

THE "TIMING"® BELT DRIVE FOR HEAVY-DUTY MACHINERY

THIS LIFE-SIZE illustration only begins to suggest the brute strength built into this double extra-heavy-duty tooth-grip belt with steel-cable tension member *designed for drives up to 1000 hp.* Appearance doesn't tell the whole story, because, rating for rating, U. S. PowerGrip "Timing" Belt drives are lighter in weight and occupy less space* than any other form of mechanical power transmission.

Approximately 2½ times larger—and 2½ times stronger—than the standard "Heavy Duty" series, the new XX Heavy Duty drives bring to high-torque power transmission a never-before-obtainable combination of features:

- **Highest-efficiency positive transmission of power.**
- **Complete elimination of drive lubrication (including the problems and accessories involved).**
- **Precise angular synchronization ("Timing") between two or more shafts.**
- **Quiet operation.**
- **Practical elimination of power loss due to slippage, friction and high initial tension.**
- **Compactness and high strength-to-weight ratio.**
- **Belt speeds as high as 7500 fpm.**
- **Low initial cost; no maintenance; long life.**

A complete line of U. S. PowerGrip "Timing" Belts—plus expert engineering assistance—is available at any of the 28 "U.S." District Sales Offices, at selected "U.S." power transmission distributors, or by writing U. S. Rubber, Mechanical Goods Div., Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

*Including accessories required by some other drives.

US RUBBER

Mechanical Goods Division

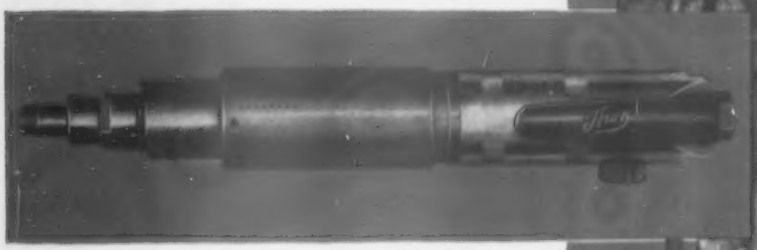
United States Rubber

NEW... for faster assembly

THOR UNI-TORK

Air and Electric Screwdrivers and Nutsetters

For *Uniform Torque* control of threaded fasteners



THOR, pioneer of so many industrial tools, inventor of the automatic screwdriver, has done it again! New Thor Uni-Tork Screwdrivers and Nutsetters completely eliminate operator judgment in the precision driving of threaded fasteners!

Thor Uni-Tork Tools deliver uniform torque output. When desired torque is reached, Uni-Tork snaps out of engagement. No more ratcheting, no slipping, no buzzing of clutch jaws.

Thor Uni-Tork's external torque adjustment, from 10 to 100 inch-pounds, permits faster set-up on any assembly job, holds torque setting indefinitely, saves wear and tear on tools.

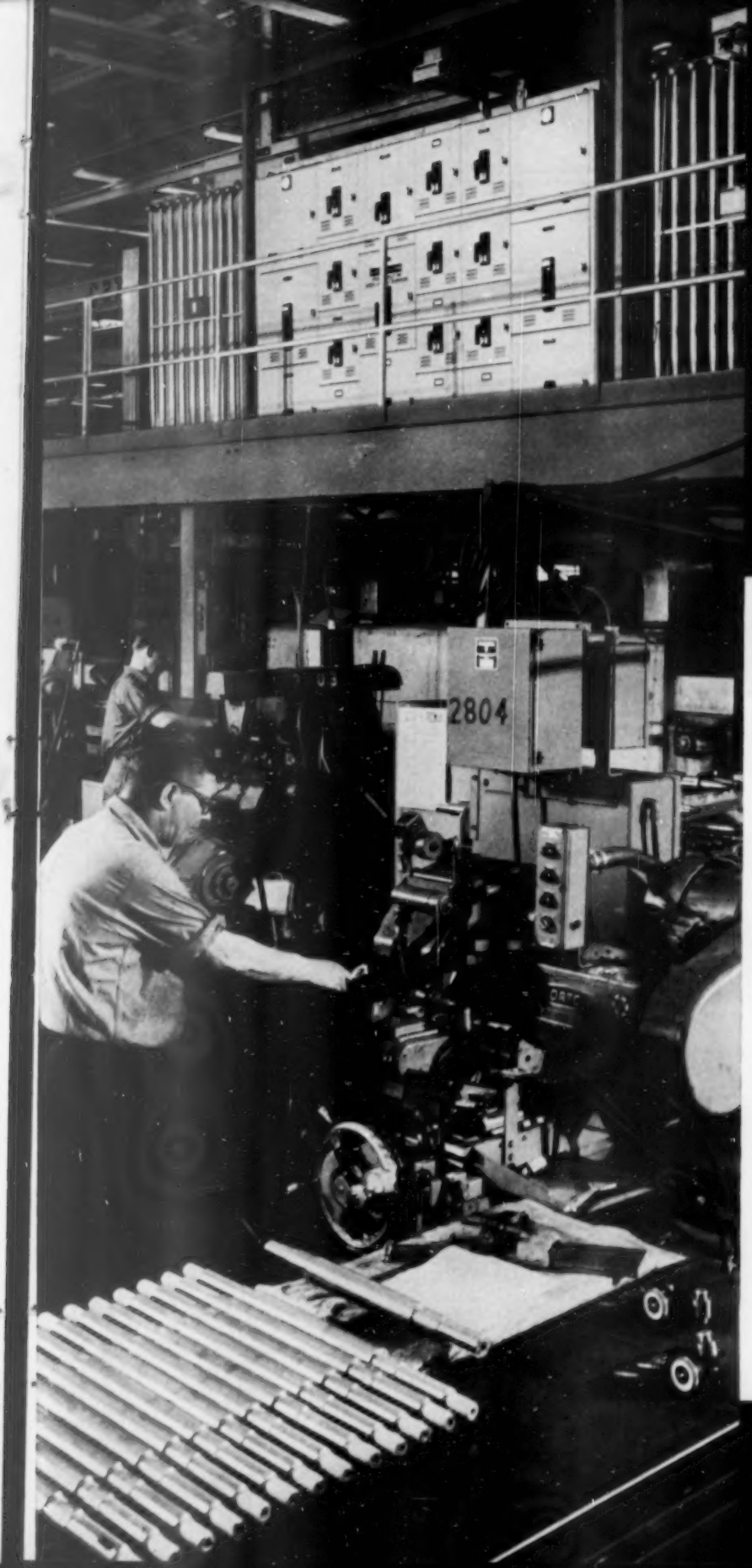
All Thor Uni-Tork Air Tools are equipped with Thor Silentair Mufflers, reducing exhaust whine to a whisper. For a demonstration, call your nearest Thor factory branch. Thor Power Tool Company.

THOR POWER TOOL COMPANY
Aurora, Illinois

Thor
PORTABLE POWER
TOOLS

You can have the benefit of Uni-Tork on your present Thor Screwdrivers and Nutsetters. Ask for full details.

Atlanta • Birmingham
Boston • Buffalo
Chicago • Cincinnati
Cleveland • Denver
Detroit • Houston
Kansas City, Mo. • Los Angeles
Milwaukee • Newark
Long Island City, N.Y. • Philadelphia
Pittsburgh • St. Louis
San Francisco • Seattle
Toronto, Canada
Export Division, New York City



As production demands increase . . .

Your power distribution system is a major key to expanded output

MAKE SURE IT INCLUDES ALL THESE VITAL CHARACTERISTICS—

RELIABILITY is essential to assure vital power for intensified operations in growing plants. On critical lines, production stoppages can cost more than power distribution system equipment.

ECONOMY of system should keep first costs reasonable, provide low operating costs, hold maintenance to a minimum.

SAFETY must be assured for personnel and equipment. If equipment is *inadequate or misapplied*, increased production with its greater use of electricity can mean more dangers.

FLEXIBILITY is required to make sure system meets changing production requirements. Relocation of machines, higher load density, special loads must all be provided for.

EXPANSIBILITY prevents early obsolescence of system by facilitating addition of capacity to serve higher loads or new production areas.

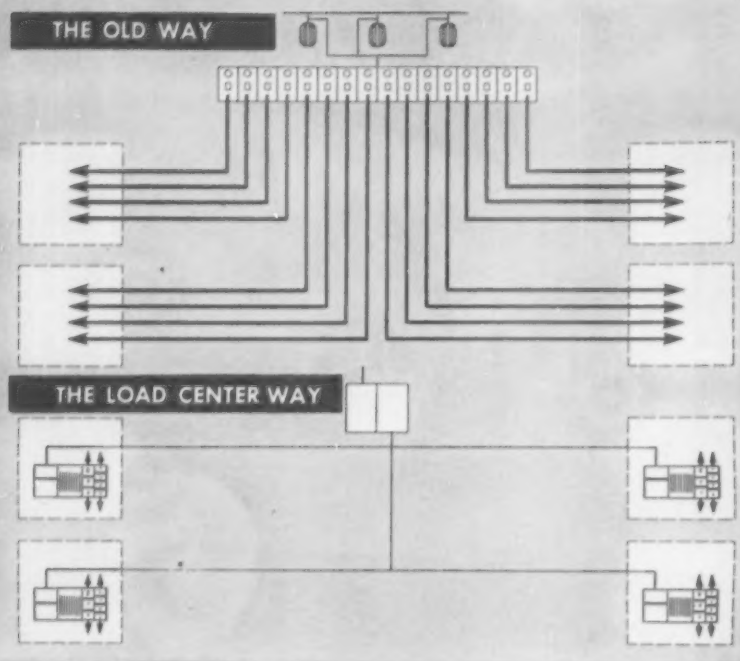
To help you achieve all these benefits in your system, General Electric presents the 8-Point Power Distribution Program found on the following pages.

GENERAL ELECTRIC

SEE GENERAL ELECTRIC'S **8** POINT POWER DISTRIBUTION PROGRAM

Point 1 USE LOAD-CENTER SYSTEM

. . . with General Electric substations to lower first costs, provide "building blocks" of power for expansion



25 PERCENT SAVING is possible with load-center system. This is due to lower costs of cable, busway, and breakers despite need for more transformer capacity. Long low-voltage feeders often caused up to 20 percent voltage drop.

Many advantages emphasize why load-center systems are rapidly replacing the old method of transforming power at one location and distributing it in long low-voltage feeders.

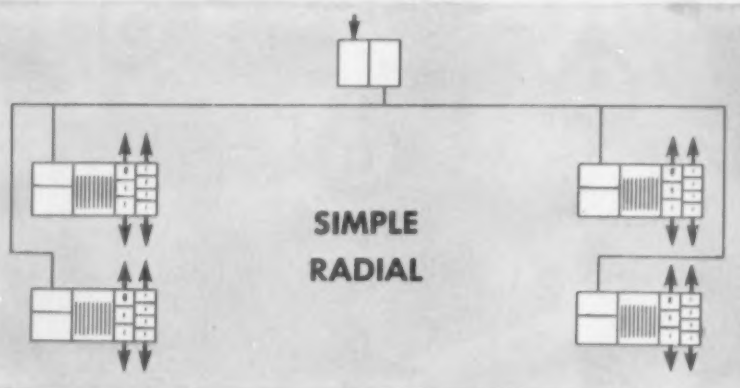
LOWER COST of load-center system comes from savings in copper and more economical switchgear. High-voltage feeders bring power close to load allowing great savings in copper from use of short low-voltage feeders. More economical feeder breakers can be used since short-circuit duty is less.

LESS VOLTAGE DROP—usually less than one percent in secondary feeders—results from shorter secondary circuits.

SIMPLIFIED ENGINEERING, INSTALLATION save valuable time, help cut costs. Factory-engineered substations are easily specified by catalog number. Units are factory-assembled, shipped ready for fast installation.

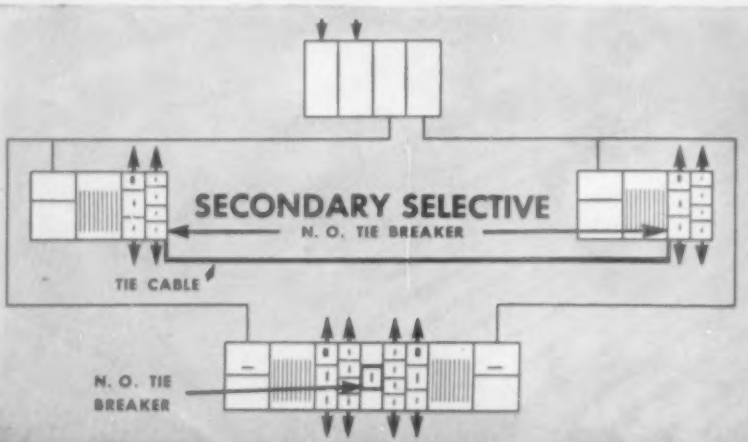
MORE FLEXIBILITY, EXPANSIBILITY make it easier to relocate or expand to meet new production needs. New blocks of power can be installed, existing ones enlarged when and where needed.

Correct application of system requires full line of high-quality substations such as General Electric units on facing page. For more information use coupon on last page of this ad.



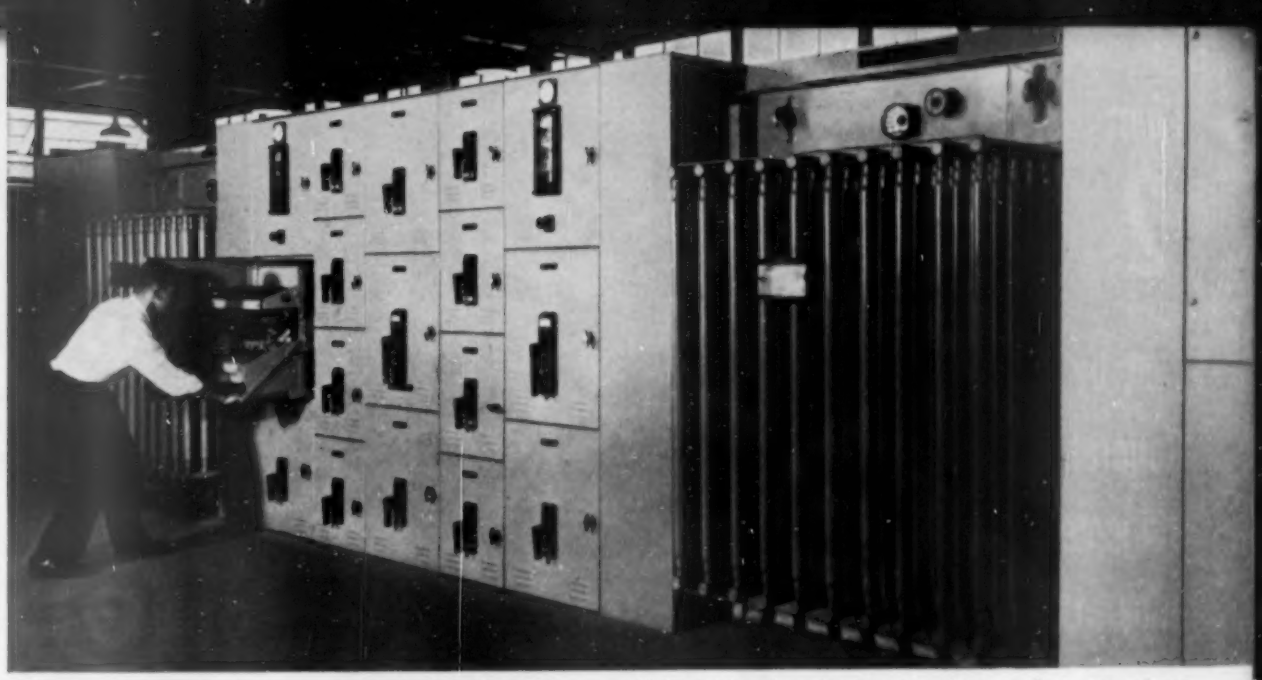
BASIC CIRCUIT is simple radial. Single primary feeds through metal-clad switchgear to substations in load areas. Since General Electric equipment has extremely low failure rates, system can have up to 99+ per cent reliability.

MORE RELIABILITY, flexibility, comes with secondary selective system. Radial primaries feed separate subs. Normally-open tie breakers can be closed to provide power from companion substation if normal supply is interrupted. System gives all reliability normally needed, costs 25-50% less than more complex methods. Its simplicity minimizes confusion during emergencies.

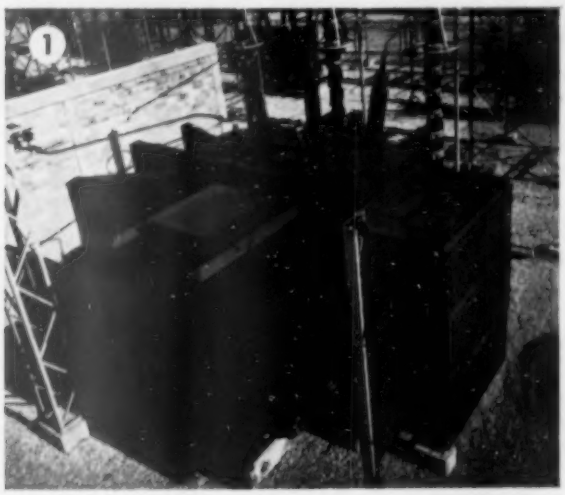


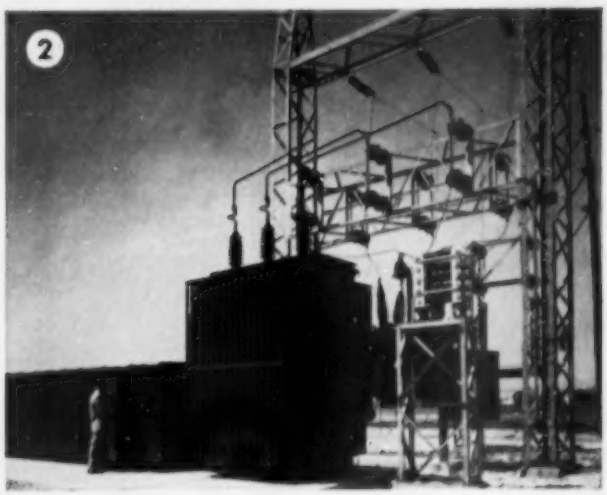
Progress Is Our Most Important Product

GENERAL ELECTRIC



KEYSTONE OF SYSTEM is load-center unit substation. Typical General Electric units are single or double ended, have Pyranol* filled (above) or dry-type transformers. Cost comparisons show most economical sizes to be 750–1000 kva at 480 volts.





FULL LINE INCLUDES—

1. **PACKAGE** substation which includes transformers, circuit breakers, structures, etc., for handling very high voltages such as 138 or 69 kv.

2. **MASTER** unit substations that reduce high primary service voltages to levels below 15 kv for distribution in buildings.

3. **INDUSTRY CONTROL** center unit substation with secondary section of control units such as Cabinetrol* starters, shown, instead of circuit breakers.

4. **DISTRIBUTION** center unit substations, either integral or sectional—ideal for small load-areas—serve up to 500 kva.

*Reg. Trade Mark of General Electric Co.

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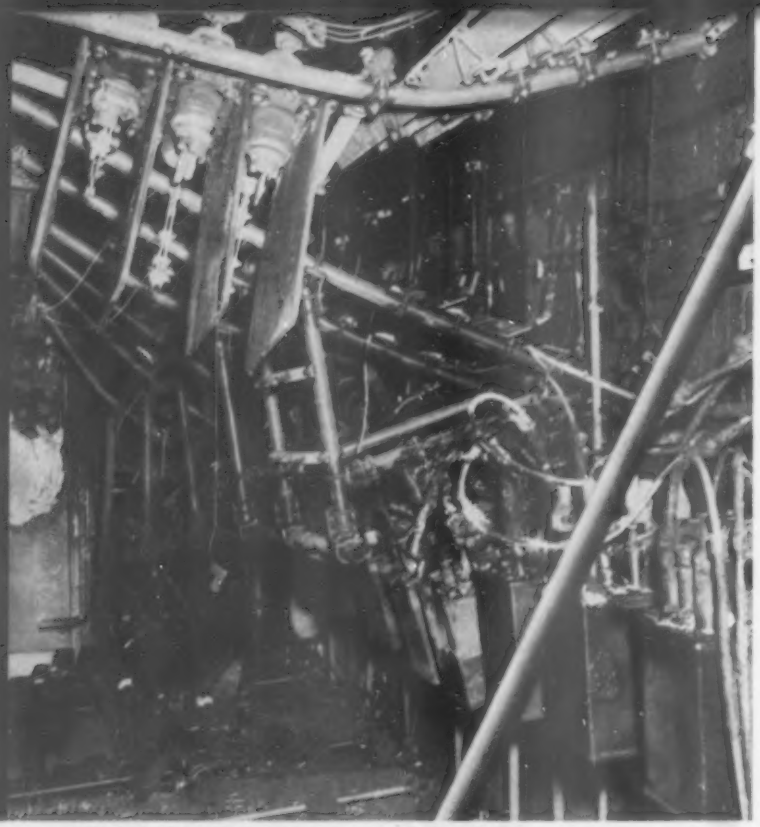
TURN PAGE FOR POINT 2

Point 2 PROVIDE ADEQUATE IC (Interrupting Capacity)

. . . by properly applying General Electric equipment to protect apparatus, personnel from short circuits



COULD THIS HAPPEN IN YOUR PLANT? Just because you have never had a bad short circuit is no sign you won't. Inadequate switchgear is like a bomb waiting to be set off. The explosion of this inadequate circuit breaker caused obvious destruction, long disruption of service, and could have cost lives.

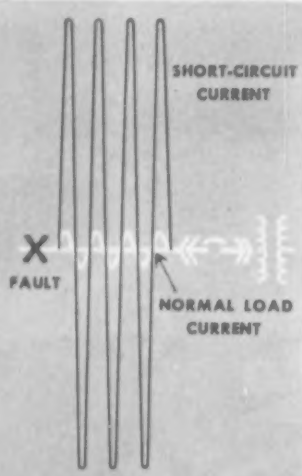
Adequate interrupting capacity means two things. First, circuit protective devices must be able to interrupt **normal load current** drawn by utilization equipment on their circuits. Second, they must be able to interrupt high **short-circuit currents** possible in case of a fault on that circuit.

MOST IMPORTANT in selecting adequately rated protective equipment is the short-circuit current. This is because it is potentially much larger than load current.

Load current depends on the load connected to the circuit. Short-circuit current has little relationship to connected load. It is determined by size of system of which it is a part—the size of transformer and connected motors.

An example of some typical short-circuit currents appears at right. Qualified power system engineers will be glad to help you determine current conditions in your plant.

TO ASSURE ADEQUATE IC after current values are known, select only protective devices of tested, proved capacity—and allow ample capacity for growth. For more details mail coupon on last page of ad.



CAN YOUR BREAKERS INTERRUPT THIS CURRENT? The sketch at left shows the typical difference in magnitudes of normal load current and short-circuit current. The latter can be even greater than 100 times the load current, making it apparent why breakers cannot be rated solely on current drawn by load.

The chart below indicates some short-circuit currents available with different transformers and systems.

SHORT-CIRCUIT CURRENT AVAILABLE ON 480-VOLT, 3-PHASE SECONDARY SYSTEMS (in amperes)

SUBSTATION RATING	Short-circuit KVA Available from Primary System			
	50,000	150,000	500,000	Unlimited
500 KVA	15,500	17,100	17,800	18,100
750 KVA	20,600	23,300	24,500	25,000
1000 KVA	26,100	30,400	32,400	33,400
1500 KVA	35,600	43,800	47,900	50,100

(Assuming 100% motor load)

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HIGHLY RELIABLE protection of service entrance when power above 15 kv is used, comes from General Electric oil-filled power circuit breakers. Capacity of these may be key to all expansion.

HIGH SAFETY is provided by metal-clad switchgear. Metal enclosures protect personnel while well-tested, magne-blast breakers help protect 2.4 to 13.8-kv power circuits.

ALL-NEW Limitamp* control provides modern protection, control of high-voltage motors (2.3-4.8 kv). Units have 60,000-amp momentary IC, and take only ½ the space of previous models.

MAINSTAYS of system IC are draw-out air circuit breakers for protection, switching of circuits up to 600 v. Recent uprating offers new opportunities for economical applications.

CUSTOM ASSEMBLED or standard motor control centers economically protect, control low-voltage motors.

DEPENDABLE protection of medium-to-large branch circuits up to 600 v can be obtained with Type AK individually mounted circuit breakers.

VERSATILE molded-case circuit breakers are available in ratings up to 600 v, 800 amps for small to medium circuits.

IDEAL for use as final protective device, quick-make, quick-break Type HCI safety switches utilize fast-acting CLF current-limiting fuses.

SAFER, convenient control of lighting or power circuits is assured by panelboards with CLF fuses or breakers.

*Reg. Trade Mark of General Electric Co.

Turn page for Points 3 through 7 of program ▶

Point 3 IMPROVE POWER QUALITY

. . . to cut power costs, increase equipment efficiency

As automated manufacturing increases and electrical loads grow heavier, improvement of power quality becomes more necessary and rewarding.

Low power factor may increase power costs (where pf penalty clause exists) and reduce feeder and substation capacity. Voltage variations can mean sacrifice of life or performance of equipment—or both.

Economical General Electric equipment is available to help assure good power quality.

POWER-FACTOR CORRECTION may reduce power costs, increases feeder capacity up to 30 percent. General Electric capacitors, like one above, can pay for themselves in less than a year and they keep paying off year after year in dollar savings.

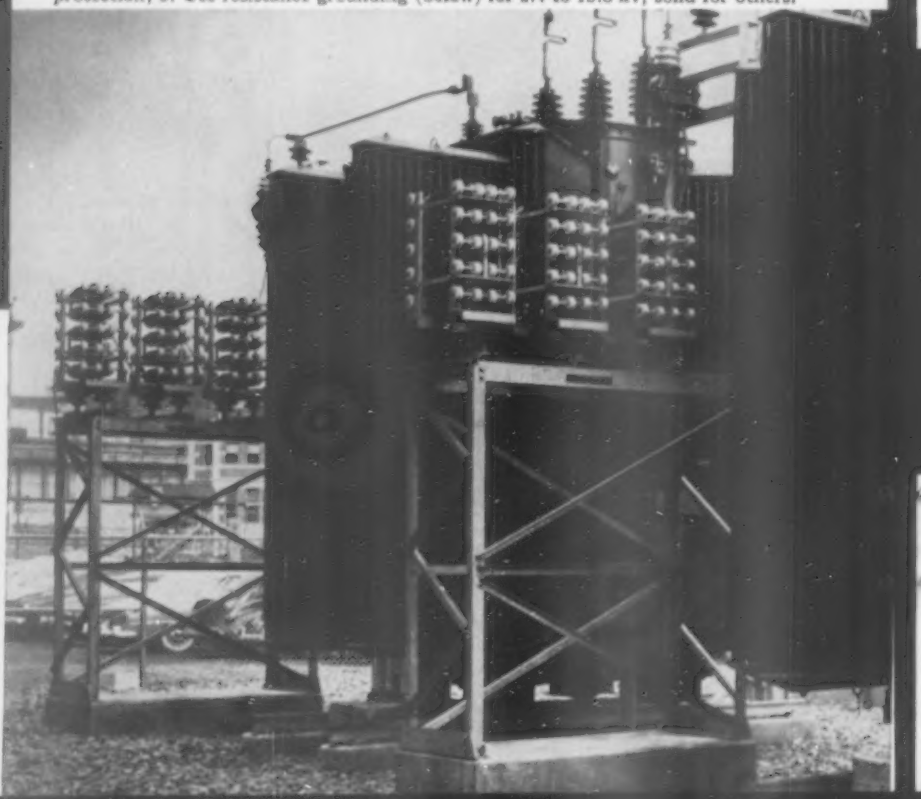
VOLTAGE REGULATION at main transformer can be accomplished with automatic load-tap-changing equipment if incoming voltage varies too much.

VOLTAGE-SENSITIVE equipment can be served by Inductrols*, above, or voltage stabilizing transformers installed in critical feeders to limit variation to ±1%.

Point 4 GROUND SYSTEM NEUTRAL

. . . to help isolate faults quickly, protect against overvoltages

FIVE GROUNDING RULES: 1. Ground neutral at each voltage level; 2. Ground neutral only at power sources; 3. Use three over-current devices or fuses—one on each phase; 4. Usually only two overload running relays are satisfactory for motor protection; 5. Use resistance grounding (below) for 2.4 to 13.8 kv, solid for others.



Trend to grounding system neutrals cuts operating, maintenance costs, protects equipment from prolonged exposure to excessive voltages due to faults. When a ground fault occurs it is immediately isolated, eliminating long searches for faulted equipment. Grounding improves service reliability by eliminating multiple faults caused by restriking grounds that build up huge voltages capable of shutting down entire plant.

*General Electric induction voltage regulators

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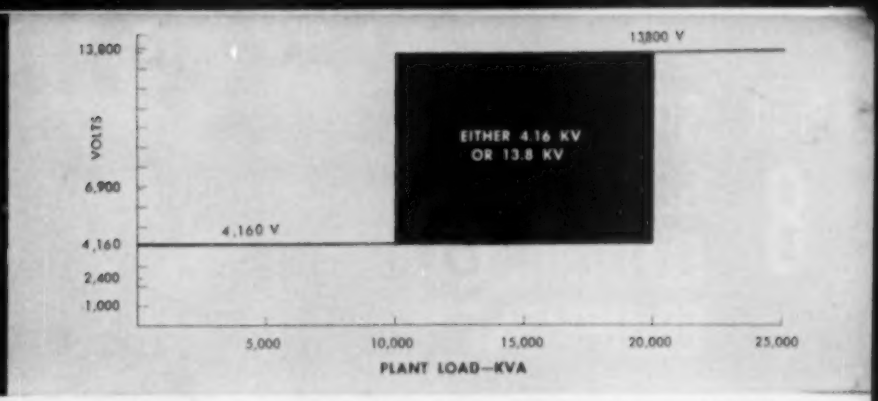
Point 5 SELECT HIGHER VOLTAGES

. . . to lower distribution costs, facilitate expansion



Select higher voltages for primary system and secondary distribution in new or expanded plants. Within limits, as distribution voltage goes up, conductor and circuit breaker costs drop.

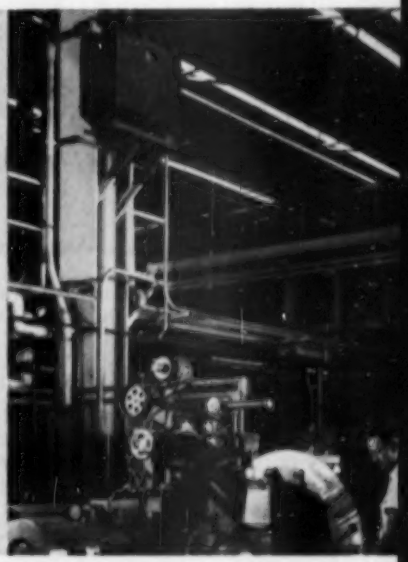
STUDIES SHOW 4.16 or 13.8 kv primary voltages will suffice for most plants. Remember plants grow—select high enough voltage now to serve larger loads of future; 4.16 might be more economical today, but 13.8 may be best in ten years. For secondary systems 480 v is usually best. It costs up to 35 percent less than 240-v system.

Point 6 COMBINE LIGHT AND POWER

. . . to save copper and dollars

Here again, higher voltage means lower distribution costs. 277-v fluorescent lighting served from line-to-neutral voltages of 480Y/277-v system provides top economy for general area illumination.

LEAST EXPENSIVE and most widely adaptable light and power design uses 480Y/277-volt system with 277-volt lighting. Power and lighting is supplied from same substation. Electricity is distributed at economical 480 volts. Some 120- or 240-volt power is always needed. It is most efficiently and economically provided by installing an economical dry-type transformer in that load area. Versatile General Electric Type D transformer is shown at right serving auxiliary equipment while machine runs on 480 volts and general area lights on 277 volts.



Point 7 USE MODERN CONDUCTORS

. . . for power distribution flexibility, economy

Modern conductors are specially designed to give fast, easy installation, provide flexibility for rearrangement of production facilities, create high feeder reliability.

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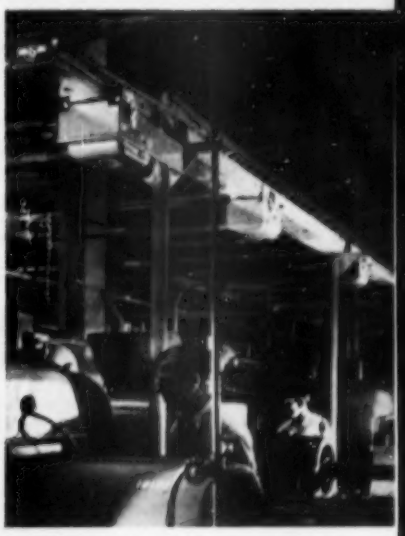
33 PERCENT SMALLER than equal-rated cable in conduit, General Electric interlocked armor cable bends easily around obstructions, has almost 100 percent relocation value.



FLEXIBILITY of machine arrangement is assured with Flex-a-Power* plug-in busway. Runs can be ceiling or floor supported, have outlets every 12 in.

*Reg. Trade Mark of General Electric Co.

Turn Page for Point 8 of program

Point 8 SPECIFY GENERAL ELECTRIC EQUIPMENT

. . . and these engineering services will be available to help protect your system investment

Not only do you receive top-quality equipment when you specify "G.E.", but General Electric's vast engineering resources also make valuable services available in six ways.

1. APPLICATION ENGINEERING assistance from industry-wide authorities like Don Beeman and Harold Kaufmann, shown above, (l-r), helps you and your consultants select and design the most efficient power distribution system. It helps you put the 8-point program to work in your plant.

2. ANALYTICAL ENGINEERING employs engineering experience and electronic system analyzers to save valuable design time.

3. PRODUCT DEVELOPMENT laboratories design, test new equipment under tomorrow's conditions to meet future increased demands.

4. FIELD-SERVICE ENGINEERING helps supervise installation, expedite start-up of major electric equipment in customer's plant.

5. MAINTENANCE SERVICE from 51 Service Shops will repair and uprate old equipment, help establish productive maintenance, furnish emergency service.

6. PROJECT CO-ORDINATION means on-time engineering, shipment, installation of electric equipment from early planning through start-up.

G-E EQUIPMENT AND SERVICE CAN WORK FOR YOU. Your General Electric Apparatus Sales Representative can obtain any or all of the power distribution equipment illustrated and the services listed above. Contact him for assistance in implementing the G-E 8-point Power Distribution Program. Send coupon below for more information. General Electric Co., Section 680-2, Schenectady 5, N. Y.

Engineered Industrial Power Distribution Systems

GENERAL ELECTRIC

JUST RELEASED *A new full-color, More Power to America motion picture on industrial power distribution—see below*

FOR MORE COMPLETE DEVELOPMENT OF THIS 8-POINT PROGRAM MAIL TODAY TO START NEW POWER DISTRIBUTION LIBRARY

Publications giving more detailed information and complete references on each of the points covered in this advertisement are currently being prepared. Bulletins covering Points 1 and 2 are completed and the remainder will be available soon. Use this coupon now to start your General Electric Power Distribution Library.

GENERAL ELECTRIC CO.
SECTION D680-2
SCHENECTADY 5, N. Y.

Please send bulletins—

☐ "How to Plan Load Center Power Distribution Systems,"

☐ "How to Provide IC for Power Distribution System Protection."

☐ Also, please send me subsequent bulletins of the library as they are published.

I should like to ☐ borrow ☐ purchase the new film, "Goodbye Steve."

NAME.....

POSITION.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

use steam efficiently, economically—choose the trap with . . .

top quality...

to keep it on the job

No need for a steam trap to be complicated. All it does is discharge condensate and air from steam lines and equipment. But its importance shouldn't be overlooked. On its effectiveness can rest your economical use of steam . . . the efficiency of your process operations.

A steam trap has to be built to serve long and dependably in severe service—and that's where Nicholson quality counts heavily in terms of performance.

- **One moving part**
- **Positive shutoff—no steam waste**
- **Powerful, intermittent valve action**
- **High capacity—effective use of large orifice**

Specify Nicholson, and be sure.

Write for new
Bulletin 10-55

NICHOLSON

W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS
LAUNDRY, DRY CLEANING AND PRESSING MACHINERY

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 98 PRINCIPAL CITIES

CLARKLIFT—

ONE HYDRAULIC LEVER

Directional Operation

Lift load.....Move lever **Up**

Lower load.....Move lever **Down**

Neutral.....Self-centering

Tilt forward.....Move lever **Forward**

Tilt back.....Move lever **Back**

it almost operates itself . . .

. . . with comfort and safety

From the single lever control of the hydraulic system to the wide foam rubber seat, your driver works in comfort and safety. Smooth, powerful acceleration, reduced steering effort and torque multiplied brakes are just a few of the many refinements incorporated in this new Clarklift to increase driver efficiency.

Reduced steering effort

Greatly improved weight distribution and large steer tires reduce steering effort when empty. Proper angle of steering wheel assures most effective leverage and comfort while maneuvering and stacking.

Excellent visibility

The unique nested construction of the new safety roller upright provides more "see-through" visibility. Cylinder placement and wider spaced lift chains present a picture window in front of the operator for unobstructed visibility in front of the truck.

Positive upright control

Precise control of the upright is afforded the operator with the new cushion valve, tilt lock valve, flow regulator and full-feathering main valve. Regulated lowering, elimination of sway and cushioning of sudden shocks make this the most controllable and safe upright available.

Greater riding comfort

The longer wheelbase and large steer tires smooth out shocks and bumps. The longer wheelbase also permits the driver's seat to be farther forward toward the center of the truck, thus smoothing out the ride.

Adjustable Seat

Foam rubber, extra wide and adjustable. This seat accommodates any size operator, in comfort, with ample leg room. Four inches fore and aft adjustment combined with the self-adjusting seat back assures proper support and reduced driver fatigue.

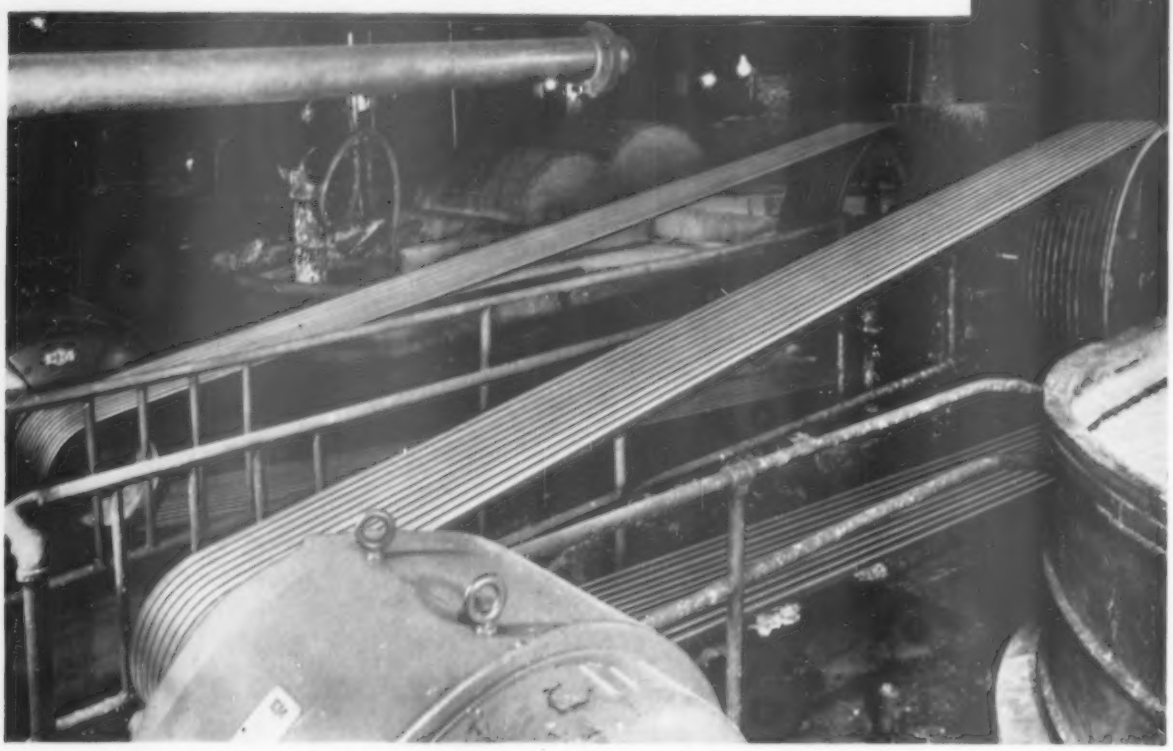
Clear Floorboard

Look at the uncluttered floorboard. No clutch pedal or shift levers to worry about, and the wide brake pedal can be operated with either foot. Difference in accelerator and brake pedal height is only 1 inch, which greatly reduces leg movement.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek, Michigan

Now "trouble" belts become trouble-free!



THE HARTFORD CITY PAPER COMPANY REPORTS:

V-belts reinforced with DACRON retain stability, withstand repeated shock loads in around-the-clock operation

REG. U.S. PAT. OFF.

Since redesigning and switching to V-belts reinforced with "Dacron"* polyester fiber, the Hartford City Paper Company reports important savings in sheave costs and space. These stronger, longer-wearing belts are installed on pulp-beater equipment operating 24 hours a day, stop and go, under severe shock loads. Despite these terriffic demands, the V-belts made with "Dacron" have dramatically cut maintenance expenses, not a lost minute of costly production time.

On the beater's two 11-belt drives, downtime has been reduced to a minimum. There is little take-up because the dimensional stability in V-belts reinforced with "Dacron" is far greater than in belts of ordinary fibers. Less stretching and slippage assure positive starting, positive working speed.

For *your* next drive, investigate the advantages of premium V-belts made with "Dacron". They combine the unique properties of the "Dacron" yarn made by Du Pont and the belt-making skills of leading V-belt manufacturers. E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Delaware.

• • •

Write for your copy of "How You Can Save Money on V-Belt Drives"

6 REASONS FOR USING PREMIUM V-BELTS REINFORCED WITH "DACRON"

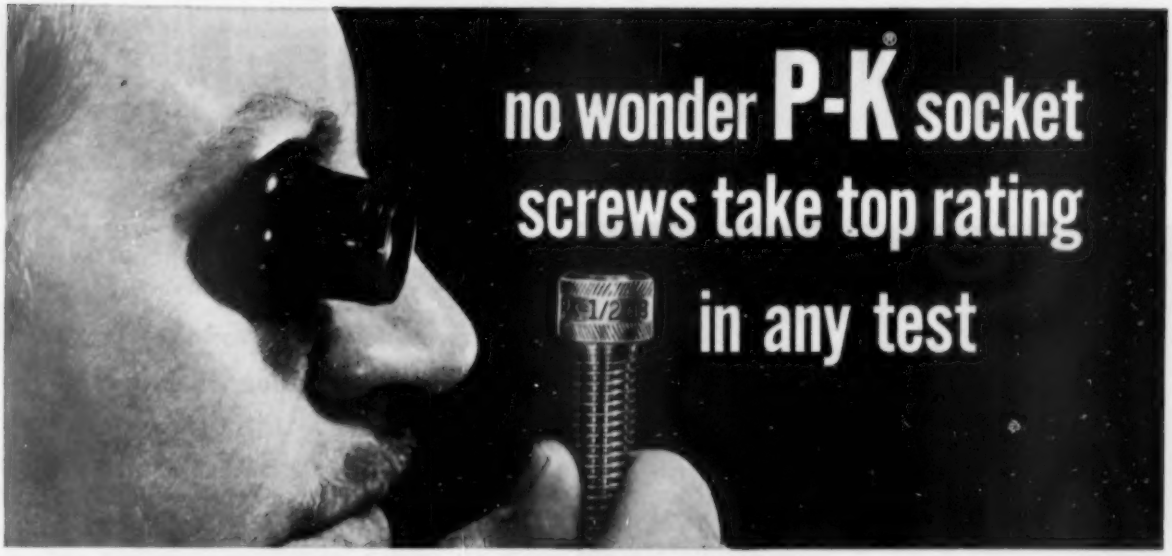
- Transmit up to 40% more horsepower, depending upon belt construction.
- Withstand greater shock loading.
- Longer flex life.
- Cut downtime.
- Low stretch.
- Require less maintenance.

***"Dacron"** in V-Belts* DU PONT

REG. U. S. PAT. OFF. REG. U.S. PAT. OFF.

**"Dacron" is Du Pont's registered trademark for its polyester fiber.*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



no wonder P-K® socket screws take top rating in any test

ROCKWELL HARDNESS TEST. With this familiar laboratory device, the hardness of screws is carefully tested as a check on heat-treatment.

PERFORMANCE. Both the raw material and finished screws are tested on this equipment to determine ductility and strength under tension loads.

HEX DIMENSIONS. To make sure that the hex meets exacting specifications, a team of inspectors check dimensions across flats at the machine.

HEAD DIAMETERS. As heads are shaved on automatic machines, such as those shown here, constant checking by operator and inspector maintains accuracy.

THREAD CONTOUR AND LEAD. The Comparator permits checking of thread contour and lead of screw heads against Class 3A Tolerances.

SEE FOR YOURSELF

These are just a few of the steps in the rigorous test and inspection routine conducted in Parker-Kalon's modern fastener plant. Exacting quality control assures that all "doubtful screws" are eliminated—that every P-K Socket Screw delivered to you is first quality. Parker-Kalon guarantees that it's first quality. In strength, dimensional accuracy and overall uniformity, you can be sure . . . "if it's P-K, it's O.K."

PARKER-KALON DIVISION, General American Transportation Corporation
Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws

PARKER-KALON® fasteners

Sold Everywhere Through Leading Industrial Distributors
Factory: Clifton, New Jersey—Warehouses: Chicago, Illinois—Los Angeles, California

ROCKWELL-BUILT

TWO NEW DELTA

ALL NEW DELTA 15"

World's most versatile drill press for all-around shop use—extra rugged for production work!

WORLD'S MOST COMPLETE LINE—Choose from the world's widest range of models for every production and shop need: floor, bench, multiple-spindle set-ups—production or standard table—plus a complete line of components for adapting to special-purpose operations.

AMAZING VERSATILITY—*Only* Delta gives you a selection of *six* spindle adaptors for dozens of operations. And they're mounted on a ground taper for *complete* accuracy, feature a threaded collar for *positive* locking.

EXCLUSIVE "UNIVERSAL" HAND FEED—*Only* Delta combines the best features of pilot wheel and single lever feeds with an exclusive universal hand feed. Gives you adjustable leverage—freedom from striking table or fixtures—almost infinite choice of feed lever positions.

BUILT FOR PRODUCTION WORK—Spindle has four over-sized, pre-loaded, lubricated-for-life ball bearings for *extra* ruggedness. Big 2" dia. quill and massive one-piece head casting provide greater rigidity. Multiple-spline "floating drive" minimizes vibration, assures smoother operation.

DELTA ROCKWELL another product by ROCKWELL

DRILL PRESSES!

GREAT NEW DELTA 20"

Designed for production tooling—
a big-capacity, heavy-duty drill press
that's built to last!

BIG CAPACITY—You get full 6" spindle travel with 5½' high column for additional spindle-to-table capacity. Choose from a complete line: floor, bench, multiple-spindle models—production or standard table—No. 2 or No. 3 Morse Taper Spindle.

RUGGED, ACCURATE—Double row, pre-loaded heavy-duty ball bearing close to the work load eliminates spindle play, assures years of lasting accuracy. Big 3¾" dia. centrifugally cast iron column with ½" thick wall is precision ground to size to give rigid backbone to machine, and extra weight for smooth, efficient operation.

SAFE, SIMPLE OPERATION—Molded, reinforced fibre glass belt guard completely encloses belt and pulleys, swings out of way for fast speed changing. Guard will not dent like steel, crack like iron, rattle like iron or steel. Quick-set depth gage with magnified scale is easy to see, easy to read.

See the great new Delta 15" and 20" Drill presses—compare with any others, *then make up your own mind! Your Delta Dealer is listed under "TOOLS" in the Yellow Pages of your phone book.*

Send coupon for all the facts!

Delta Power Tool Division,
Rockwell Manufacturing Co.
628L N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send me complete information on new Delta 15" and 20" Drill Presses.

☐ Please send name of my nearest Delta Dealer.

Name _____ Title _____

Company _____

Address _____

City _____ County _____ State _____

ONLY AMERICAN AIRFREIGHT OFFERS

AMERICAN AIRLINES
Airfreight costs less than you think. A typical 100 lb. airfreight shipment costs only $7.50 from New York to Chicago—$18.80 from Chicago to San Francisco.

Plant executives who use airfreight to keep production schedules on time specify American Airfreight for these reasons:

COVERAGE

Only American offers you the extra speed of direct one-carrier service to all ten leading retail markets...more than two-thirds of the top thirty... all twenty-three leading industrial areas, in the United States.

CAPACITY

American has space for your shipment where and when it's needed most. A combined daily lift potential of over a half million pounds gives American the greatest cargo capacity of any airline.

PLANT EXECUTIVES ALL THESE BENEFITS

FREQUENCY

Shipments get faster forwarding...spend less time in terminals with American's greater frequency of schedules. Over 1000 departures daily offer more service to more cities than any other air carrier.

DEPENDABILITY

First with scheduled airfreight, American today has the largest, most experienced personnel force . . . most modern handling facilities. Is better able to solve shipping problems . . . provide dependable on-time deliveries.

AMERICAN AIRLINES AIRFREIGHT

—carries more cargo than any other airline in the world

JAMES E. DAVIS CHIEF ELECTRICIAN
NORTHWESTERN GLASS CO.

"Our Production schedule was frequently disrupted by needless shutdowns on a line of motors . .

until we changed to Fusetron Fuses"

James E. Davis.
CHIEF ELECTRICIAN, NORTHWESTERN GLASS COMPANY
SEATTLE, WASHINGTON

"Ordinary 500 amp. renewable fuses were blowing frequently in a 1000 amp. switch that controls a line of motors ranging in sizes up to 150 hp.

"We work on a tight production schedule, so these shutdowns with men and motors standing idle were costing us a considerable amount of money and trouble.

"As chief electrician, the problem was 'thrown in my lap'.

"A study of the situation indicated that harmless surges were causing the fuses to blow.

"We figured that the long time-lag of Fusetron dual-element fuses might correct the trouble.

"They were installed in 1953 and the original Fusetron fuses are still in service.

"We think this is quite a record because the switch is loaded to capacity 24 hours a day 7 days a week, only Christmas and July 4th excepted."

Here's why Fusetron Fuses give all purpose Protection

A fuse link combined with a thermal cutout - the result, a fuse with tremendous time-lag and much less electrical resistance and an interrupting rating in excess of 100,000 amps.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses. FUSETRON Fuses fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 amperes, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

Write for bulletin FIS.

THOMAS F. CURRAN
MACHINE OPERATOR

FOR LOADS ABOVE 600 AND UP TO 5,000 AMPS., USE BUSS Hi-CAP FUSES . . .

They have unlimited interrupting capacity to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

Write for bulletin HCS.

FUSETRON DUAL-ELEMENT FUSES DO MORE THAN ELIMINATE DOWN PERIODS CAUSED BY NEEDLESS BLOWS . . .

They Provide 10 Point Protection . . . .

1. High interrupting capacity — protect against heaviest short-circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes.
2. Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.
3. Protect against needless blows caused by harmless overloads.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect against waste of space and money permit use of proper size switches and panels.
6. Protect motors against burnout from overloads.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Protect motors against burnout due to single phasing.
9. Make protection of small motors simple and inexpensive.
10. Protect coils, transformers and solenoids against burnout.

***Play Safe!* install FUSETRON dual-element Fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!**

BUSSMANN MFG. COMPANY
(Division of McGraw Electric Co.)
UNIVERSITY AT JEFFERSON ST. LOUIS 7, MO.

Gulf Sales Engineer T. F. Irving checks with Frank Buettner, heat treating foreman, on the results of hardness obtained in heat treating bolts at Lamson and Sessions' plant in Cleveland, Ohio.

Why one of the world's largest nut and bolt manufacturers

—Lamson and Sessions—

has been a long-time user of

Gulf Super·Quench

The metallurgists at Lamson and Sessions discovered that with Gulf Super-Quench they were able to achieve deeper, more uniform hardness without cracking or distortion and virtually eliminate rejections. Furthermore, it made possible the use of steels which previously could not be hardened to their specification.

Lamson and Sessions was also impressed with the ability of this outstanding quenching oil to retain its quenching power indefinitely with only normal make-up and that there was no need for additive replenishment.

Let a Gulf Sales Engineer help you discover profitable opportunities to use Gulf Super-Quench in your plant. Consult the yellow pages of the telephone directory for the number of your local Gulf office.

Clip and send the coupon for your copy of our informative brochure on this quality product.

GULF

Gulf Oil Corporation • Gulf Refining Company

1822 Gulf Building, Pittsburgh 30, Pa.

FM&M

Gentlemen:

Please send me, without obligation, a copy of your 24-page brochure dealing with the application and advantages of Gulf Super-Quench.

Name _____

Title _____

Company _____

Address _____

How Morse Distributor critical indexing problem

H. C. Smith Oil Tool Company increased production one-third, reduced labor cost 30%—another example of how Morse Distributors serve industry.

When the H. C. Smith Oil Tool Company, of Los Angeles, faced a precision indexing problem in machining gear-type oil drill bits, they called a Morse Distributor.

Harold Kimmel, sales engineer for J. W. Minder Chain and Gear Company, analyzed the operation. He specified Morse MC 6000 Cam Clutches to provide an infinitely accurate feed for the milling process. Result: an increase of end milling machines from two to three cutting units, at a labor costsaving of 30%.

Read the picture story, and see why you can rely on Morse Distributor engineering service and complete stocks for fast answers to your power transmission problems.

"The Morse MC 6000 Cam Clutch was the ideal solution to the precision indexing problem in this high-speed milling operation," says Harold Kimmel, sales engineer for the J. W. Minder Chain and Gear Company. It is accurate up to 1/10,000 of an inch.

engineering service solved in milling operation

R. E. Goetz (center), manufacturing engineering supervisor, and H. E. Kidder, factory manager of H. C. Smith Oil Tool Company, outline problem to Harold Kimmel. Slight indexing errors are cumulative in milling gear-type cutters shown.

Kimmel gets on-the-spot information while watching Milling Foreman Lloyd Fage run high-speed, two-flute end mill. He notes that present differential transmission and worm gear indexing systems are inaccurate and slow down production.

Kimmel and stock clerk select an MC 6000 Cam Clutch right off the shelf. Complete local stocks of Morse products make a big difference on rush power transmission problems.

Morse Distributors can help *you*

Call in your local Morse Distributor when you need power transmission equipment.

- **He can give you skilled engineering assistance on all power transmission problems.**
- **He offers complete stocks of Morse precision-built power transmission equipment, ready for immediate delivery.**

Call on your Morse Distributor any time for fast service, quality products, and experienced engineering help. He is only as far from you as the Yellow Pages of your local telephone directory.

MORSE CHAIN COMPANY
INDUSTRIAL SALES DIVISION
ITHACA, N.Y.

MORSE MORSE BW

POWER TRANSMISSION PRODUCTS

*Trademark

"My boss agreed . . .

'Let's use Westinghouse maintenance service . . . then we can really concentrate on production!'

"He knew that growing maintenance problems were already cutting into our manufacturing efforts. As plant electrical maintenance engineer, I had been studying the situation for some time.

"We were working old equipment harder than ever, with more shifts per week resulting in less time for maintenance. We simply couldn't afford prolonged down time because production losses mounted too rapidly.

"Production facilities had expanded considerably, but space for maintenance was still limited. We also lacked enough trained personnel and proper equipment. Our ability to handle conditions was inadequate.

"We turned to Westinghouse who with its repair facilities, renewal part stocks and field engineers, was able to solve our problem. We're saving money and the job is being done better than ever. You can probably do the same." J-95172-1

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

You Need Dependable
Round-the-Clock
Maintenance Service
To Maintain Production

- Motors
- Generators
- Exciters
- Welders
- Transformers
- Control and Switchgear
- Lifting Magnets
- Circuit Protective Equipment

Here's our answer to this problem

"When we called in Westinghouse . . .

"We learned new ways to prolong equipment life, lower maintenance costs

"We cut capital investment and reduced operating expense by letting Westinghouse service our electric equipment. It all started when the Westinghouse representative appeared and made his presentation, 'The Economies of Electrical Apparatus Repair.'

"He showed that Westinghouse had the men, materials and methods to do a superior job for us three ways: repair plants, engineering and field service and renewal parts.

"We liked the proposal and gave Westinghouse a larger share of our maintenance and repair work. Besides sound engineering consultation, we get round-the-clock service and a one-year guarantee. Equipment life has been prolonged, maintenance costs are lower and down time is reduced. Here's why.

"We broadened our repair facilities without investment or upkeep when we began to use some of the 38 well-equipped Westinghouse repair plants.

WATCH WESTINGHOUSE

"Westinghouse uses specialized and standardized repair methods with quality control checks that assure maximum performance from every repair job. Newly developed techniques are applied immediately to all repair jobs by skilled Westinghouse craftsmen.

"We benefit by new Westinghouse developments in design and modernization because Westinghouse repairs are backed by its entire manufacturing and engineering resources, including research. For example, Westinghouse has engineered individual rewinding processes like Bondite, Coilife, Thermalastic* and silicone to meet operational demands on electric equipment in any industry.

"*Westinghouse engineering and field service* tests, inspects and repairs our large apparatus that can't be moved readily.

"These skilled specialists eliminate trouble before it starts through preventive maintenance. This prevents critical shutdowns and reduces big repair bills . . . makes valuable equipment last longer. This service helps our own staff by furnishing exacting tests that are possible only with special equipment.

"Westinghouse field engineers redesign and rebuild old equipment to meet up-to-date needs. As in Westinghouse repair plants, they use the latest methods and processes for thorough, longer lasting repairs.

"*More value for our parts dollar* . . . that's our experience with genuine Westinghouse renewal parts. They're precision-built to fit right . . . save hours on repair jobs. We get original equipment performance, or better . . . because of advanced designs, proper methods and materials, thorough tests and inspection.

"Constant improvements through research go into Westinghouse parts and materials. Result is exclusive features, plus top performance, economy and convenience. For example, coils insulated with Bondite, Thermalastic and silicone will upgrade, and in some cases, actually up-rate old equipment.

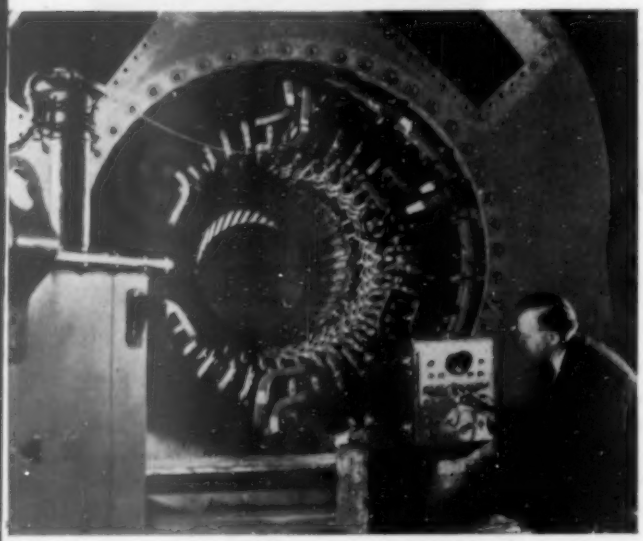
"Thirty-four strategically located Westinghouse renewal parts warehouses with back-up stock at numerous manufacturing plants help us reduce our parts inventories as much as 50%.

"Why not call Westinghouse, like I did? Its personnel will gladly work with your staff to improve maintenance and boost your productivity."

Call your local Westinghouse sales representative for a presentation of, "The Economies of Electrical Apparatus Repair", and a personally guided tour through a local Westinghouse repair plant. Or write, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-95172-2

Slot discharge test detects capacitive discharge which can destroy coil-ground insulation. Slot discharge analyzer is an exclusive Westinghouse development.



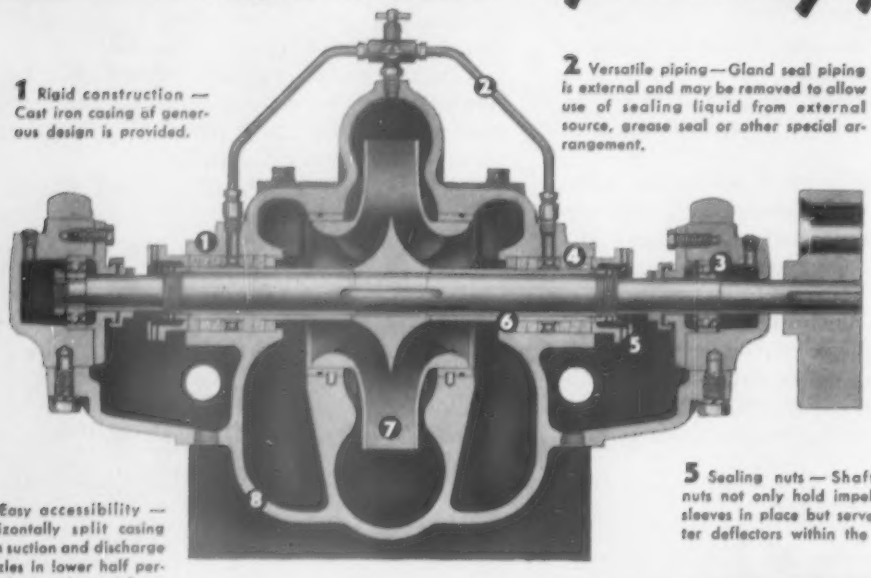
Fast, efficient Westinghouse ordering system and parts warehouse in your area help you keep on hand only those parts most frequently required.

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

NEW ALLIS-CHALMERS double-suction PUMP

8 Quality Features

... and it's specially priced



1 Rigid construction — Cast iron casing of generous design is provided.

2 Versatile piping — Gland seal piping is external and may be removed to allow use of sealing liquid from external source, grease seal or other special arrangement.

3 Ball bearings — Grease lubricated, single-row bearings are held in proper alignment in a heavy one-piece housing.

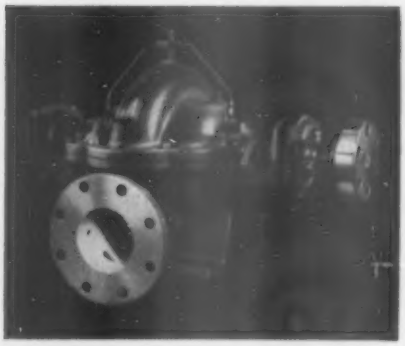
4 Generous stuffing boxes — Boxes are deep to carry ample backing, yet are easily accessible for maintenance.

5 Sealing nuts — Shaft sleeve nuts not only hold impeller and sleeves in place but serve as water deflectors within the glands.

6 Long wearing sleeves — Standard shaft sleeves are of accurately machined bronze. Sleeves extend through stuffing box, right up to impeller hub.

7 Vibrationless operation — Bronze impeller is carefully balanced, double-suction type.

8 Easy accessibility — Horizontally split casing with suction and discharge nozzles in lower half permits inspection without disturbing piping.



... for broader range of general purpose use

This pump has all the quality features needed for many applications . . . and at the *right price!* It combines the precision machining, skillful assembly and rigid construction that assure proper alignment and long parts life.

Stock sizes are available for quick shipment.

Remember Allis-Chalmers, too, if you have a special pumping problem — in fact, for any of your pumping jobs.

Besides offering a broad line of high quality pumps, there's another advantage in specifying Allis-Chalmers equipment.

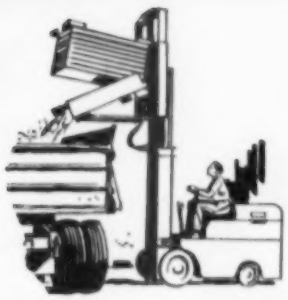
The complete pumping unit—pump, motor and control—can all be furnished by A-C. That means easier engineering and ordering plus undivided responsibility — better service.

Get New Bulletin! Ask your nearby A-C distributor or office for Bulletin 08B8233. Or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4871

ALLIS-CHALMERS

How materials handling is made easier by B.F.Goodrich Industrial Tires



Fast, quiet and cushioned! These new electric sit-down trucks run quickly and quietly through the aisles of this big Food Fair warehouse. Smooth Tread DeLuxe Cushion Pressed-On tires help cushion fragile food loads, prevent damage.

Dual drive wheels and differential action permit easy steering of this pedestrian-operated power lift truck. B.F.Goodrich Vulcanized-on tires with smooth tread are "just right" here. They will take heavy loads and withstand the wear and tear of short, sharp turning.

Car-mover and yard-hauler, too! This vehicle handles two jobs. It pulls railroad freight cars. Or it drops its "ground" wheels with B. F. Goodrich All-Purpose pneumatic tires, drives off the tracks and pulls trailers through factory yards. All-Purpose pneumatic tires provide the traction and strength required for versatile use.

Up and down the ramp 125 times a day with sugar! Here's a job that B. F. Goodrich Pressed-On Lug tires help make easy. Pressed-On tires provide firm cushioning to protect loads, lessen driver fatigue by reducing vibration. The Lug tread supplies the traction necessary to negotiate ramps in all kinds of weather.

more

For More Facts Circle 48a on Reader Service Postcard

B.F.Goodrich

TW Analysis cuts tire costs

Varying loads and conditions at the Port of Portland warehouse calls for versatile tires. You just can't beat these B.F.Goodrich All-Purpose pneumatic tires for all around use in all kinds of weather, inside or outside.

Paper for paper cups. Here a heavy coil of paper is moved gently to production lines at the Solo Cup factory in Chicago. Roll clamps and the cushioned ride provided by B. F. Goodrich DeLuxe Cushion Pressed-On tires protect both the load and floors from damage.

Potatoes for potato chips! About 160,000 pounds of raw potatoes are handled every day by this truck at the H. W. Lay and Company plant in Atlanta. Smooth Tread Pressed-On tires absorb shock, provide load protection, reduce floor wear and lessen driver fatigue on this big job.

Ask for a FREE TW Analysis

If you know which industrial tires—which types, sizes, tread designs and compounds—are right for your materials handling jobs, then you can cut your tire costs. The B. F. Goodrich Tire and Wheel Analysis man can give you the answers. His recommendations could save you as much as 50% on tire costs, up to 20% on maintenance expense. Just mail the coupon for this free service. A consulting service is available to manufacturers of materials handling equipment.

B.F.Goodrich
FIRST IN RUBBER

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-606, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

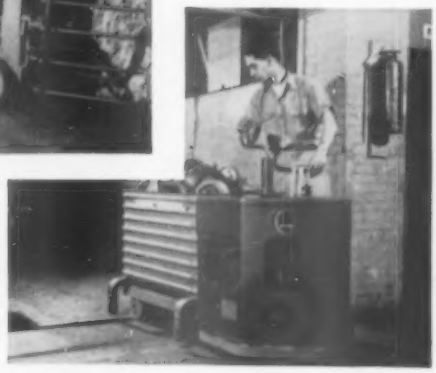
NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

Specialized equipment saves money! Pronged attachments for handling wool saved $8,320 per truck annually in this textile mill. Long-wearing B. F. Goodrich Pressed-On tires with smooth treads are saving money here, too, because they are engineered to match the job.



Sometimes a combination is best! On this truck the main drive wheel (under housing) is a B. F. Goodrich Pressed-On tire with a traction tread. The two tires on the load wheels are Vulcanized-on tires for extra load capacity.

Specify B. F. Goodrich **tires when ordering new equipment**

For More Facts Circle 48a on Reader Service Postcard

In this case, Schrader Double Acting Cylinders measure amounts of chocolate to be pumped into wax molds in this candy-making operation. Schrader Flow Control Valves, also indicated in red, control speed of cylinder action. Hundreds of other Schrader Products make "automating with air" easy to adapt to almost any manufacturing hookup.

Schrader Air Products fill candy molds with chocolate measured to ± 1 gram

Problem: To mass-produce candy figurines, filled solid with chocolate—a tricky sweet to handle. **Solution:** One Buffalo company uses a battery of Schrader Air Cylinders which measure the chocolate to within one gram, and precisely, neatly, swiftly fill the figures.

The uses of Schrader Air Products are limited only by producers' imaginations. Versatile, safe, simple and fast, the hundreds of different units in Schrader's complete line can be employed singly or in combinations to perform automatic operations. And wherever air is used, economies are gained that increase its efficiency even more.

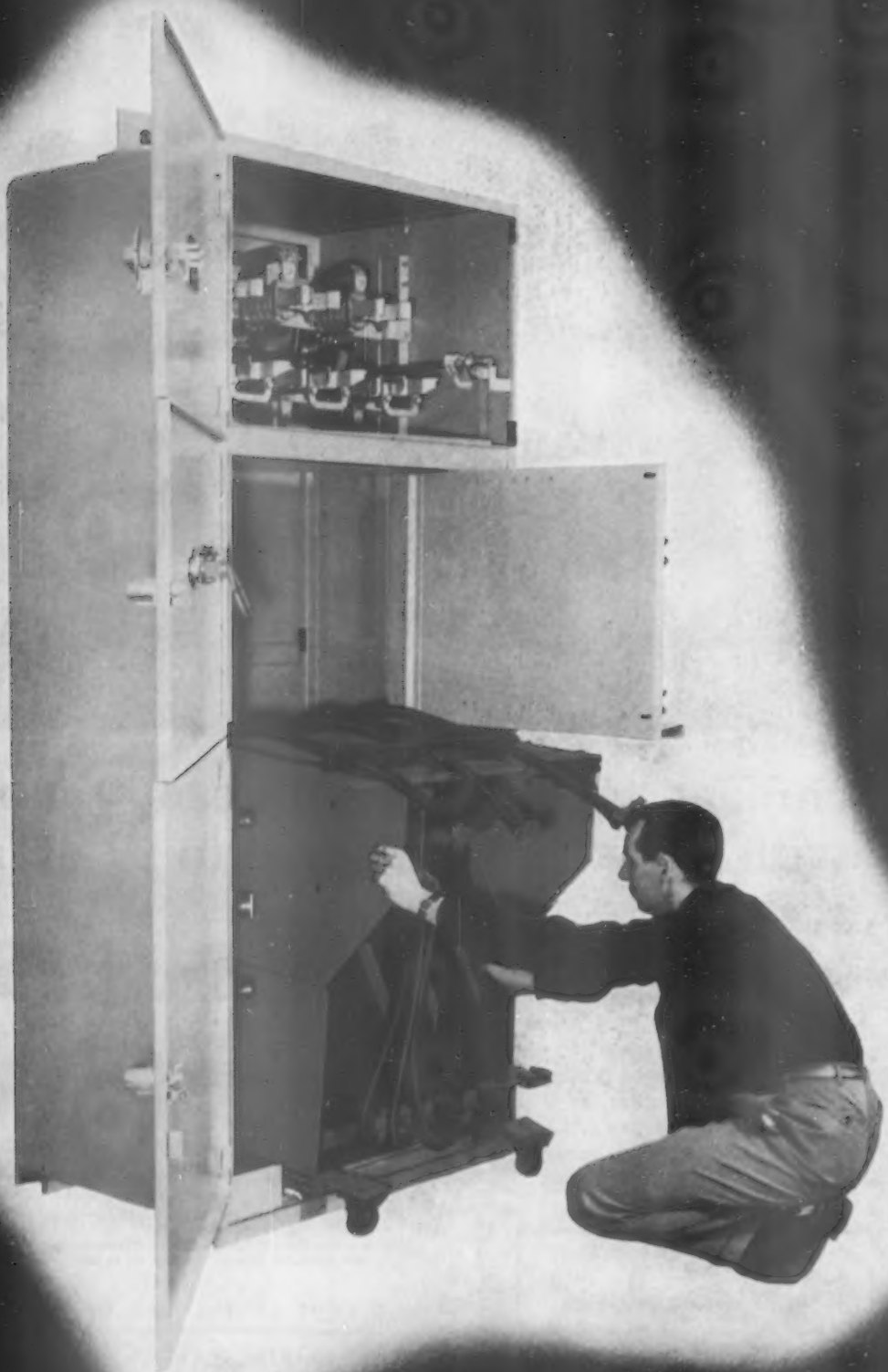
Think air whenever you think automation—in holding or positioning work, moving scraps or chips, or synchronizing actions. Upon request, Schrader engineers will assist you in planning for your best use of air, and in selecting the products best suited to your applications. Outline your problem and we'll be glad to help. Or send for the latest informative booklets which show Schrader Air Products that will simplify your production.

Schrader®
ESTABLISHED IN 1844

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
457 Vanderbilt Avenue, Brooklyn 38, N. Y.

FIRST NAME IN THE USE OF AIR
FOR INDUSTRIAL PRODUCTION AND CONTROL

HIGH-VOLTAGE MOTOR CONTROL.....



...LEADER IN DESIGN AND PERFORMANCE

GENERAL ELECTRIC LIMITAMP* STARTERS OFFER ROLL-OUT CONTACTOR UNITS FOR EASIER INSTALLATION

Today's General Electric Limitamp starters are designed to bring you the utmost in installation ease, speed, and economy.

Key feature of this cost-cutting design is the caster-mounted contactor unit which can be easily rolled into or out of the Limitamp enclosure. After swinging out the hinge-mounted low-voltage panel, and before rolling in the contactor unit, the installation man can walk right inside the enclosure to make connections quickly and conveniently.

Once connections are completed, the panel can be closed and ready to operate within seconds. Limitamp panels control and protect motors rated 2300 to 4800 volts and ranging up to 3000 horsepower.

MORE LIMITAMP CONTROL FEATURES

Fast, economical installation is but one benefit of General Electric Limitamp control. There are many more. For instance:

- Five-square-foot saving of floor space through use of higher-capacity fuses to eliminate need for an extra fuse cabinet.
- Increased personnel safety provided by three-phase disconnect switch.
- Flexible arrangement of units and added space savings, with all connections made from front.
- Complete range of modifications to meet any installation requirement.

REALIZE THESE BENEFITS NOW

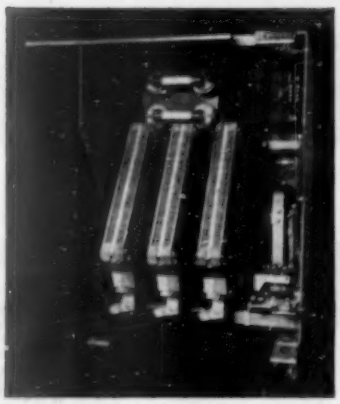
Don't be satisfied with "old-fashioned" high-voltage motor control: Specify General Electric's Limitamp control—*leader in design and performance.* Contact your G-E Apparatus Sales Office today, or write Section 783-2, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia.

*Reg. Trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC



MAINTENANCE EASY on contactor; generally devices are front-removed.

THERE'S AMPLE SPACE to stand inside enclosure and make necessary connections. Yet entire control requires 50% less floor space than before.

SPECIALLY DESIGNED solve a problem,

Corrugated steel construction of these units provides strength, assures long service life. Special channel construction under boxes permits free movement of casters, yet allows four-way entry for lifting and storing.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

REPUBLIC BOXES speed handling ...save space

Today's modern high-speed machines may meet the demand for increased production. But they can also create problems.

This was the case at the Crown & Closure Division of Crown Cork and Seal Company, Inc., Baltimore, Maryland, world's largest maker of metal closures for glass containers.

Their problem was the handling, moving and storing of the tremendous daily output of a battery of screw cap machines. Some of the machines turn out as many as 100,000 screw cap shells per hour. A handling unit was required that could be used to rapidly move the semi-finished caps from the machines to a final manufacturing operation located on another floor—or to a storage area for future use.

Republic Materials Handling Engineers were invited to work on the problem with Crown Cork Engineers. The solution was the design and fabrication by Republic's Pressed Steel Division of the special box-type trucks shown at left.

Equipped with casters, the boxes can be moved easily by hand. A time-saving feature is a hinged door which opens when the box is tilted forward. This permits the caps to slide out and down a chute to the floor below where final manufacturing is completed. The entire handling operation is simplified and speeded. Storage space is conserved.

This is another example of customer service from Republic—another example of experience and versatility in solving a materials handling problem. Perhaps you would like to talk over your handling problems with a Republic Engineer. There's no obligation. Simply contact the nearest Republic Materials Handling Equipment Representative. Or send us the coupon.

STEEL
and Steel Products

SPEED HANDLING of heavy materials, like bar stock, with Republic Chain Slings, Attachments and Accessories. All Republic Chain Slings are proof tested and warranted to meet or exceed specifications. They provide an exceptionally high degree of safety. Republic's Bolt and Chain Division makes chain slings in Alloy Steel, High Test Steel and Wrought Iron. Republic chain engineers are always available to help you select the proper chain for your particular requirements.

SOLVE THE PROBLEM of storing heavy items with Republic Wedge-Lock Steel Shelving. It is specifically designed for high stacking of enormous weights. As more weight is added joints actually get tighter. Wedge-Lock Steel Shelving provides maximum loading in minimum floor space. It is completely flexible to meet changing space requirements. It can be assembled quickly and easily. Send coupon for full information.

REPUBLIC STEEL CORPORATION
Dept. C-2189
3140 East 45th Street
Cleveland 27, Ohio

☐ Send more information on Materials Handling Equipment.
☐ Have a Materials Handling Engineer call.
Send additional information on:
☐ Chain Slings ☐ Wedge-Lock Steel Shelving

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

Now! Push-button air conditioning with...

Trane CenTraVac® for runs automatically

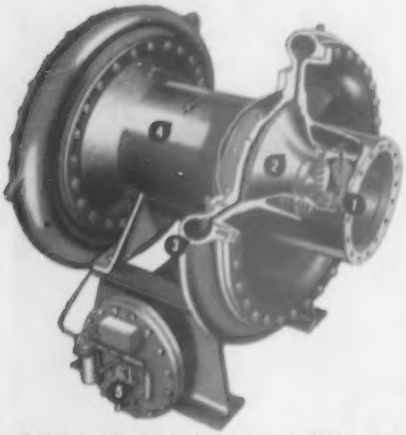
Fully automatic refrigeration unit, up to 1500 tons capacity, starts at the touch of a button. Exclusive hermetic design and control system eliminates hours of purging and checking shaft seals before start-up, simplifies cooling system operation.

No shaft seals to cause Freon loss or require constant maintenance! No external drive. All working parts hermetically sealed inside housing. *CenTraVac Freon charge guaranteed for one full year!*

Only one major moving part! Only *two* main bearings! Operates only when full oil pressure is applied to *both* bearings. *For dependability!*

No costly multi-level base required. May be set directly on a level concrete floor of sufficient strength to

Compare these exclusive features



1. Variable inlet vanes.

2. Nonferrous impeller with radial blades.

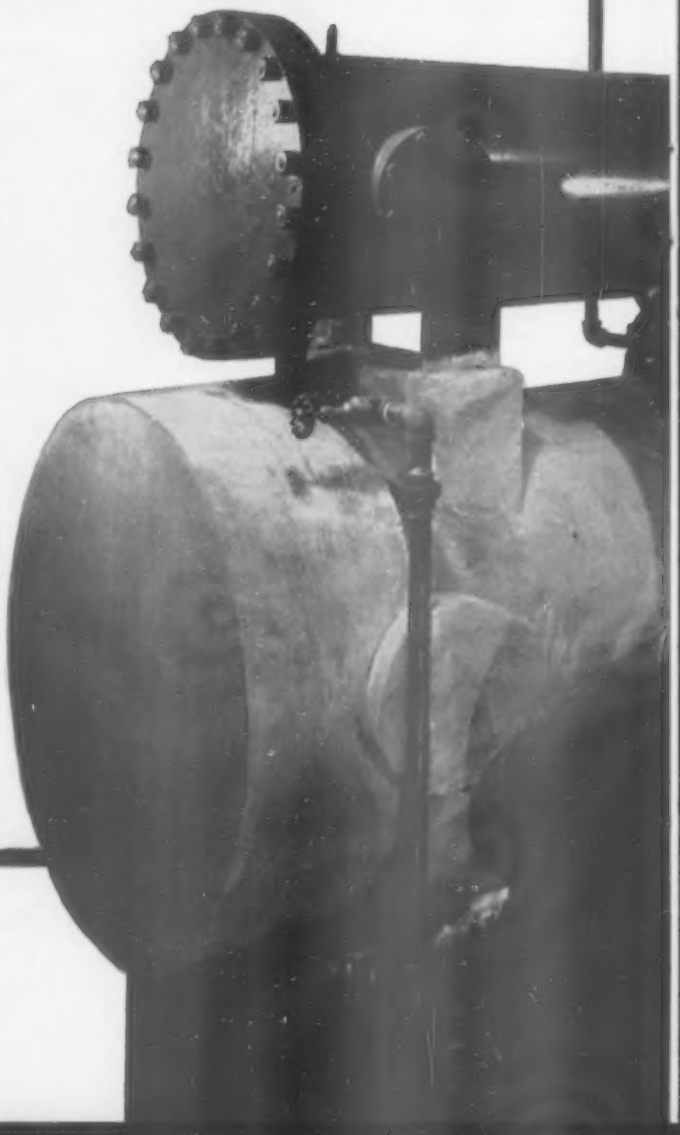
3. Volute housing. Carefully machined gas passages insure smooth gas flow.

4. Hermetically sealed motor.

5. Forced-feed lubrication system. Pump located below normal oil level — assuring oil supply.

- **Most modern** centrifugal compressor in the industry . . . gives added insurance against obsolescence for years to come.
- **The only hermetic** centrifugal design. All working parts inside. Eliminates gearbox, expensive variable speed motor, shaft seals . . . saves up to 10% power costs.
- **Matches capacity to load** smoothly from 100% to 10% of capacity . . . saves power . . . boosts efficiency.
- **Unrivaled dependability** . . . longer service—only *one* major moving part.
- **Smoother control** . . . exclusive variable inlet vanes give finer modulation.

Here's how CenTraVac cuts operating costs TRANE CenTraVac modulates from 100% down to 10% of capacity—*with power savings in almost direct proportion!* Now in 23 sizes, 45 to 1500 tons capacity.



TRANE Climate Changers—full line of factory-assembled air conditioners. 600 to 29,000 cfm.

TRANE Cold Generators—packaged water chillers from 10 to 150 tons capacity.

chilling water...starts, stops, ...no special attendant needed

support its weight. No foundation bolts or reinforcing needed. Saves on installation costs.

Lower operating costs! CenTraVac automatically adjusts to varying cooling needs from 100% to 10% of capacity—with power savings in *almost direct proportion* to load. Saves up to 8% power compared with 4-step capacity control reciprocating compressor. Hermetic design eliminates power-wasting gearbox and expensive variable speed motor, thus producing outstanding economies in power consumption. Users are assured of substantial savings . . . *plus* years of trouble-free operation!

For complete information on TRANE CenTraVac and the complete TRANE line of air-conditioning equipment, call your nearest TRANE Sales Office or write TRANE, La Crosse, Wis.

one source one responsibility

TRANE

Refrigeration Equipment

for more dependable . . . lower cost air conditioning

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton, Penn. • Trane Co. of Canada, Ltd., Toronto • 90 U. S. and 14 Canadian Offices

Serving Industry with

MODERN METHODS

for Joining Metals

SIGMA WELDING

A high speed, automatic fusion welding process. . . . Employs argon gas to protect weld area from contamination. Joins all commercially fabricated metals, and attains high production speeds in all operations. Manual and automatic mechanized equipment is available.

"UNIONMELT" WELDING

Makes sound welds up to 1½ in. thick in one pass. This plus high welding speeds make it the most economical process for a wide range of fabricating and repair jobs. Both portable manual, and automatic mechanized setups are available.

"HELIARC" WELDING

Ideal for light gage metals. . . . Joins all commercial metals. Welding can be done in all positions on all types of joints with portable manual, semi-automatic, and fully automatic mechanized equipment. Operations are fast and efficient.

OXY-ACETYLENE WELDING, BRAZING, AND SOLDERING

Permits fabrication and repair of a wide range of structures and parts made of metal. Ideal tools for small shop jobs, to production line operations by large manufacturers.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde," "Heliarc," and "Unionmelt" are registered trade-marks of Union Carbide.

Linde
Trade-Mark

★ ★ ★ FLASH

SPEEDI-DRI SPOTLIGHT

★ ★ ★ FLASH

A REPORT TO MANAGEMENT ON INDUSTRIAL MAINTENANCE

VOL. 11 NOVEMBER 1956 No. 2

Sol-Speedi-Dri Now Flecked with Green

OUT OUR WAY BY J. R. WILLIAMS

OWOOH! FOR NINE YEARS HE'S BEEN STANDIN' ON SOL-SPEEDI-DRI AN' HE DON'T KNOW WHAT IT'S FOR!
BECAUSE IT'S NONE OF MY BUSINESS! THEY GOT MEN DOIN' THAT!
WHY IS IT SOME PEOPLE HAVE GOTTA BREAK A LEG OR ARM OR SUMPIN' BEFORE THEY BOTHER TO FIND OUT ABOUT SOL-SPEEDI-DRI?
THE HERMIT
J.R.WILLIAMS

FIVE FACTORS THAT CONTROL FINAL ABSORBENT COSTS

Price is an important factor in your choice of a mineral floor absorbent—but, obviously, not the *only* consideration. Here are some other things to weigh before making your selection:

ABSORPTION
Does the material thoroughly absorb and retain oil and grease deposits—keep floors slipproof under foot? If not, it means more frequent application, requiring more material and manpower. And what price do you put on a crippling injury caused by a slip or fall?

VOLUME WEIGHT
The more volume you get per pound of absorbent, the more coverage you get (a pound of feathers spreads farther than a pound of sand)—and the more economical it is for you to use.

UNIFORMITY
Do you get uniform volume weight and efficiency—bag after bag, all year long? You're paying a uniform price.

ABRASIVENESS
Is the material gritty and abrasive to the extent it could damage working parts of machinery?

DUST
Does the absorbent create dust when applied or when subjected to heavy traffic. A dusty absorbent causes serious maintenance problems—affects efficiency and morale of workers.

Judge Sol-Speedi-Dri by these factors—and you can't logically use any other mineral absorbent!

Top-Selling Oil and Grease Absorbent Has New "Trademarking," New Performance Qualities

Now, with carload shipments leaving our plant daily, industrial maintenance men can be sure they're getting the "finest of oil and grease absorbents" for their plant floors. For Sol-Speedi-Dri—long the answer to that description—now has a *new look*. Scattered through each bagful are granules of pure Sol-Speedi-Dri *colored green* by a new process. These green flecks have been developed for your protection. They're a trademark that clearly identifies *double S-d* quality—and none other!

VASTLY IMPROVED PRODUCT
Green-flecked Sol-Speedi-Dri is new in more ways than one. Speedi-Dri Corporation's research laboratories have made dramatic improvements in basic *double S-d* properties — improvements that mean easier application and removal, more efficient performance, and greater dollars-and-cents economy.

VOLUME WEIGHT, COVERAGE
The amount of absorbent needed to cover your floors is in direct ratio to the amount of labor required to spread the material—and the amount of your annual maintenance bill. The new, improved Sol-Speedi-Dri is uniformly lighter in volume weight—spreads farther, requires less manpower, trims your costs.

ABSORPTION, RETENTION
Sol-Speedi-Dri's harder, thirstier, more dustfree granules absorb and retain oils and greases more efficiently than ever—leave floors clean, dry, safe under foot.

NEW LOOK FOR BAG
Green-flecked *double S-d* is new outwardly, too. Its bag has a brand-new design (see sample version below)—and features two sturdy kraft paper walls, plus a 90-lb. asphalt liner with siftproof seams.

NEW VALUE FOR YOU
For real efficiency and economy in floor maintenance, get green-flecked Sol-Speedi-Dri—your guarantee of dependable quality!

SEND FOR YOUR FREE SAMPLE

SPEEDI-DRI CORPORATION
(A subsidiary of Minerals & Chemicals Corp. of America)
80 Essex Turnpike, Menlo Park, New Jersey

☐ Send me a free sample of the new improved Sol-Speedi-Dri

Name_____

Company_____

Address_____

City_____ State_____

DISTRIBUTED IN CANADA BY G. H. WOOD & COMPANY, LTD., TORONTO

Keeping production on the move with Westinghouse pushbuttons

On Ford assembly lines, automation starts with the press of a button. From the paint line (shown), 18 different body styles are automatically guided to various trim lines. As each body passes the operator, he channels it to the proper trim line simply by pressing a button.

In textile mills, steel, paper or fabricating plants, Westinghouse pushbuttons are also on the job, guiding smooth-functioning lines of material to finished product stages. Doing it faster, better, and at a lower operating cost to you than ever before possible.

From Westinghouse you can get precisely the right operator, enclosure, whatever you need—when you need it. Complete lines of standard-duty, heavy-duty, and Oil-Tite* pushbuttons are stock items with Westinghouse.

Write to Westinghouse, Box 868, Pittsburgh 30, Pa., or see your nearby Westinghouse distributor for a copy of the new *Pushbutton Guide*, B-6749.

*Trade-Mark
J-30229

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*

Build with new, low-cost DEXION Slotted Angle

WORK TABLE

GOODS CART

STORAGE RACK

No drilling or welding! No waste! Just cut DEXION and bolt the frame you want in minutes!

All you need is a DEXION Cutter and a wrench to transform this precision-made, cold-rolled, galvanized steel angle into practical, useful, economical equipment used almost anywhere in your plant, warehouse, store or office.

Scientifically spaced slots and holes make it easy for you to build an infinite variety of structures. And almost anybody can assemble DEXION. There's no confusing array of tricky parts to cope with.

To save time, work and materials, there's nothing like DEXION. You can use it over and over—it never wears out.

DEXION CUTTER

The secret of DEXION'S fast assembly is the special DEXION CUTTER. One quick downstroke gives you a clean, accurate edge.

DEXION PANELS, CASTERS

Use DEXION panels for shelving or tables. Will support heavy weights. Bolt easily to any DEXION frame. Casters make frame movable.

DEXION Slotted Angle is a packaged product, ten pieces to the package, 10 or 12 foot lengths. Two sizes: 3″ x 1½″ x .104″ and 2¼″ x 1½″ x .080″.

Write today for free DEXION folder, dept. FAD-116. DEXION Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois and for the name of your nearest DEXION office or distributor.

DEXION SLOTTED ANGLE

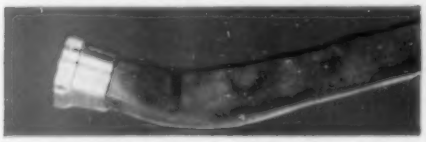
ACME STEEL

NOW! 1½ INCH DOUBLE JACKET MUNICIPAL FIRE HOSE in 100-FOOT LENGTHS!

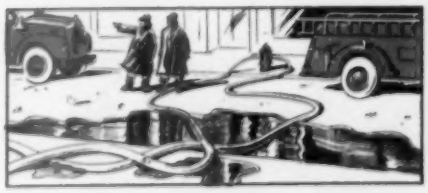
It's new "Quaker 100"—a 600 lb. hose. And it's quick drying, easy to pack and fold

● "Quaker 100" is made from extra-long staple cotton, chemically treated to keep its flexibility and reduce elongation. It is exceptionally light and strong.

LIGHT WEIGHT. One coupled length of "Quaker 100" weighs only 34½ lbs., as opposed to a weight of 51 lbs. for two coupled 50-foot lengths of our popular Delaware brand.



EXTRA STRONG. The specially treated cotton, which supports the "Dacron" filler cords, provides at least 10% more strength in each warp strand woven into the jacket. (Average burst pressure per three foot length is 1200 lbs.)



QUICK DRYING. "Quaker 100" actually absorbs 25% less water than the conventional 600 lb. dacron filler hose. "Quaker 100" packs and folds in less time and space.

GOES INTO ACTION QUICKLY. 100 feet long, "Quaker 100" reduces by 50% the danger of couplings pulling off or becoming snagged. The hose "corners" easily.

"SMOOTH-AS-GLASS" WATERWAY. The close picks per inch of the weave reduce friction loss to a minimum (as do 50% fewer couplings).

One look at new "Quaker 100" Double Jacket municipal fire hose is all you'll need to see the savings . . . to see how easy it is to use and maintain. Why not take that look soon?

If you'd like the name of the Quaker or Quaker Pioneer Distributor nearest you, just write. He can save you time, trouble and money. Write, too, for free brochure on "Quaker 100".

Quaker HKP

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION
PHILADELPHIA 24, PA.
QUAKER PIONEER RUBBER DIVISION
PITTSBURG, CALIF.

✓Totally Enclosed
✓Class H Insulation
-at no extra cost

ALLIS-CHALMERS Dry-Type TRANSFORMERS

FORGET all about maintenance with this Allis-Chalmers totally enclosed, 150 C rise, dry-type transformer. No dirt, dust, moisture or lint can get at it. Use it indoors or outdoors. It is completely weatherproof.

Class H insulation used throughout the coil structure results in long insulation life. Case temperatures are low—do not exceed maximum of 40 C rise. All safety requirements are easily met. No vaults or barriers are needed.

Modern design features result in a compact, convenient transformer that will give years of satisfactory operating life. All these advantages are available at no extra cost.

For Complete Information, call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

1. Coil has maximum insulation life with Class H (150 C rise) insulating materials.

2. Simple, sturdy, totally enclosed weatherproof case has just one welded seam.

3. Recessed bottom plate has eight bolts for positive closure, yet gives quick accessibility.

A-5126

ALLIS-CHALMERS

LIVE BETTER ELECTRICALLY

Most power per dollar of any drill !

Back by popular demand!
Black & Decker 1/4" Standard

HOLGUN

(CODE No. 345)

1. Lowest-priced drill in its class!
2. Wear-resisting ball bearings.
3. Compact and lightweight—reduces operator fatigue.
4. No stalling under heavy loads.
5. Belongs to world's best-known drill line.

The new model Black & Decker 1/4" Standard Holgun combines lightness and power. It's your ideal tool for a raft of drilling jobs. Powered by a B&D-built motor, it has stamina to spare. Rugged construction gives you years of trouble-free service.

See your B&D distributor today or write: The Black & Decker Mfg. Co., Dept. 1311, Towson 4, Md.

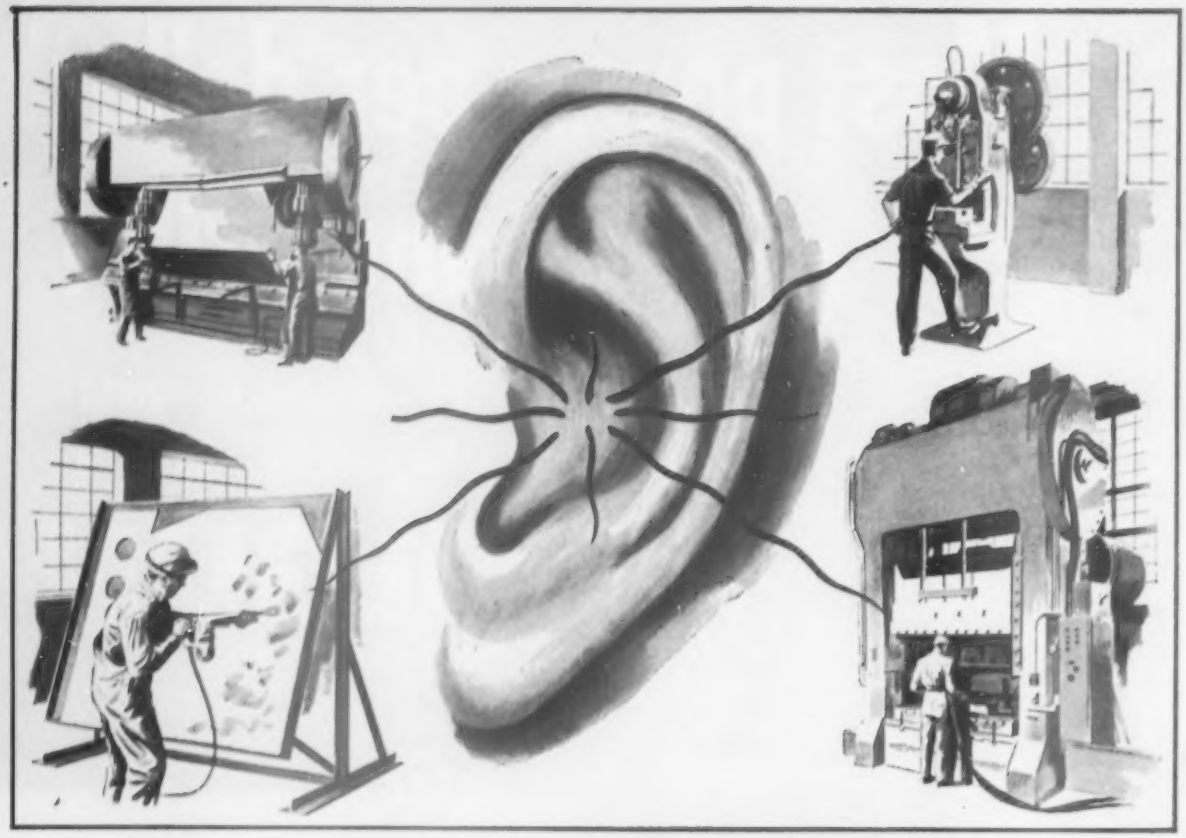
Look in the Yellow Pages under "Tools—Electric" for Nearest Distributor.

Black & Decker Tapgun

Drives up to 1/4" taps for threading holes in steel, cast iron, brass or aluminum. Automatic reversing mechanism. Lightweight. Easy to handle. *The only tool of its type!*

B&D **Black & Decker®**

Portable electric tools . . . *power-built* to last!



KOPPERS "SILENCE SERVICE"
Eliminates Cost-Consuming Noise

Improves Communications. Prevents Hearing Damage to Employees. Increases Employee Efficiency, Morale.

Noise costs you money because it reduces the production output per worker and, in many cases, the actual working period per worker. Koppers "Silence Service" can eliminate profit-eating, production-interfering noises that impair the efficiency and health of your workers.

Koppers "Silence Service" engineers analyze your plant's individual noise problems . . . then custom-design equipment that meets your specific requirements . . . and install that equipment quickly and economically. These units are simple to maintain . . . provide years of trouble-free performance.

Effective noise control in industry demands acoustical "know-how" and facilities. Koppers engineers have silenced jet engines, drop hammers, punch presses and many other types of industrial noises. Koppers backs up its field staff with one of the largest privately owned acoustical research laboratories in the United States.

Those plant noises you may be taking for granted are cutting a good-sized chunk out of your profits. Discover how you can eliminate these costly noises quickly and economically. Write to KOPPERS COMPANY, INC., Industrial Sound Control Dept., 6011 Scott Street, Baltimore 3, Maryland.

KOPPERS INDUSTRIAL SOUND CONTROL EQUIPMENT FOR EVERY NEED

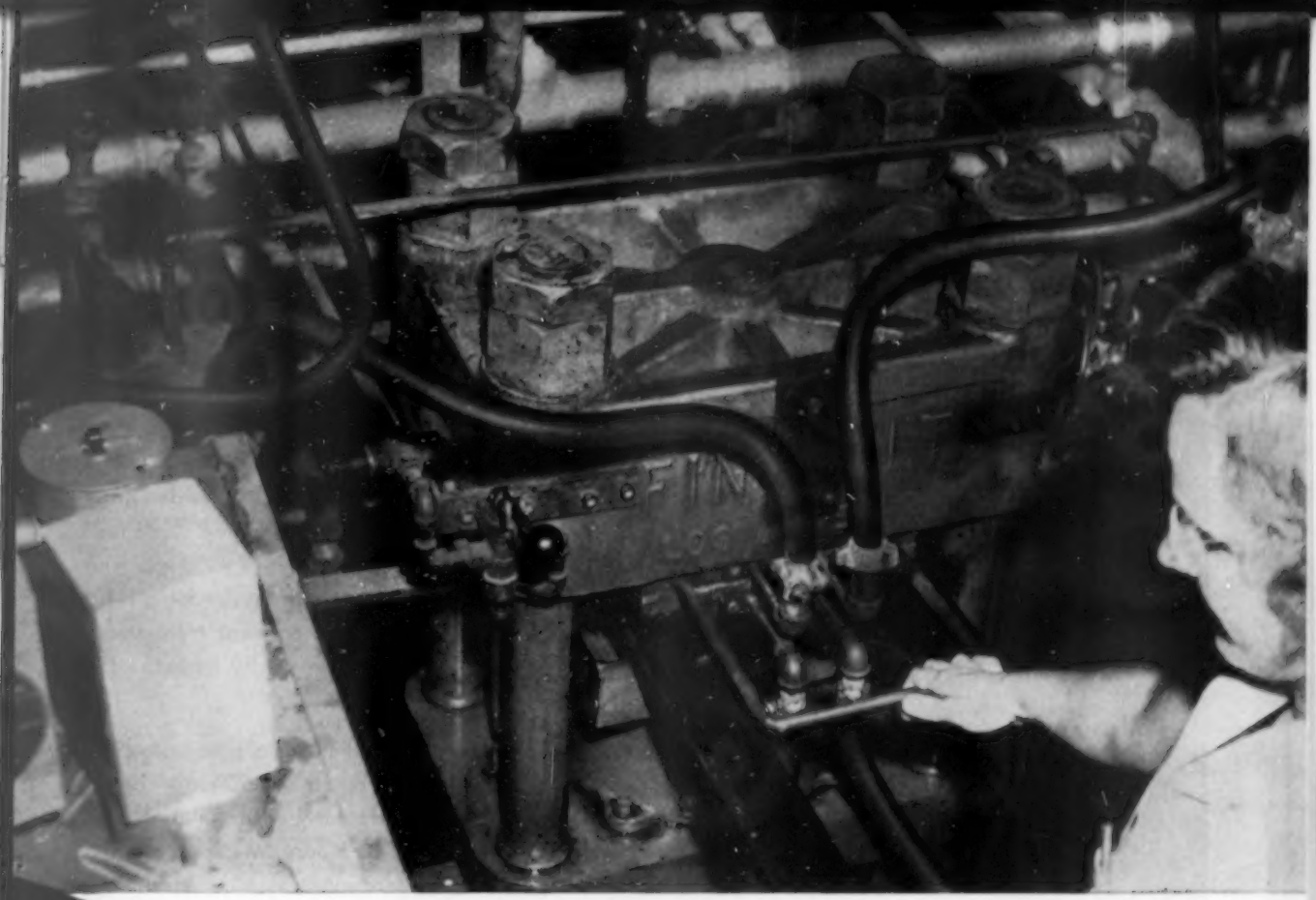
- **Machinery Enclosures**
- **Acoustiphone Booths**
- **Portable Sound Barriers**
- **Soundproof Doors**
- **Soundproof Rooms**
- **Audiometric Rooms**

KOPPERS

INDUSTRIAL SOUND CONTROL

Koppers Company, Inc., Metal Products Division
Industrial Sound Control Department

Engineered* Products Sold with *Service



Here's a Record Making Hose!

Every 30 seconds superheated steam follows ice water—and Thermoid Hose outlasts all others

In manufacturing phonograph records, Plastic Products Company, Memphis, uses Thermoid Wire Braid Steam Hose to carry steam into its molds at 375° F. under 175 lb. pressure. Every 30 seconds, the steam is followed by icy cold water—*through the same hose!* This hot and cold cycle goes on eight hours a day, month after month.

Thermoid outlasted every other hose tried by this record maker.

Here is another example of how Thermoid Personalized Service fulfills special demands. To meet the most exacting requirements of any plant application, your Thermoid Distributor carries a complete line of Hose, Conveyor Belting and Multi-V Belts.

There's a Thermoid Conveyor Belt

. . . and Matched Multi-V Belts for every industrial need.

Thermoid

Thermoid Company, Trenton, N. J.

Superintendent Moore checks hydraulic pressure on the plywood press from this automatic control panel.

Aeroquip Hose Lines on this automatic control panel have been in service more than two years.

"Aeroquip High Pressure Hose Lines Give Us Trouble-Free Service"

reports maintenance superintendent of Memphis Plywood Corporation

Aeroquip High Pressure Hose and Fittings have been used on a hydraulic plywood press for more than two years without a single failure. Operating at pressures of 2500 psi., with surges up to 5000 psi., these Aeroquip Hose Lines are also subject to heat from steam plates on the press which dry and cure the plywood panels.

"After using several makes of hose unsuccessfully, I tried Aeroquip in 1954 and it has been a 100% trouble-free installation ever since," says C. B. Moore, Memphis maintenance superintendent.

If you have a fluid line problem involving high pressures, heat, vibration or flexing, solve it with Aeroquip. Call the Aeroquip Distributor listed in your Yellow Page Phone Book or write us.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 15, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Bostitch D9AD Stapler *power drives* staple into carton flaps and *clinches from the outside*

"Stapling results in a 20% saving"

says PLANT SUPERINTENDENT

Plant superintendents are always looking for ways to cut costs. When a Bostitch Economy Man called at the plant where this photo was taken, a brief demonstration was enough to prove the advantages of a Bostitch air-driven stapler over gummed tape.

In practice, results are:

1. 20% saving in fastening time
2. Neater, cleaner package
3. More space left free for advertising and stenciling on container
4. Improved employee morale and efficiency

Call your nearest Bostitch Economy Man (375 of them in 123 cities) or mail coupon.

Fasten it better and faster with

BOSTITCH
STAPLERS AND STAPLES

START SAVING NOW!

BOSTITCH, 611 Mechanic St., Westerly, R. I.

☐ Send me a folder about D9AD Air Driven Stapler
☐ Ask an Economy Man to call on me

We are now using (please check)
☐ gummed tape ☐ steel bands ☐ glue ☐ other

Name _____

Company _____

Address _____

City _____ Zone ____ State _____

Your employees *see*, *breathe* and *feel* better in a *"humanized"* metal factory by **Butler**

Butler "daylight" factories just naturally boost morale. Workers never complain of eyestrain. Cheery, natural daylight streams through the low-cost Butler Lite*Panls in the roof illuminating *everything*.

There are no flat ceilings to hold down hot, stale air. In a Butler factory, air rises naturally to the pitched roof and escapes through peak ventilators. Air is constantly fresh at work levels.

A Butler insulated building can be heated or air-conditioned more efficiently than conventional structures. Heating or cooling units can be smaller . . . fuel and power costs are lower.

Post-free interiors provide unobstructed vision, wider aisles and better placement of machinery to give workers maximum freedom to move and work.

All these advantages, and more, are inherent in the building itself. But this is no ordinary building, it's a new management tool — a new concept in construction that is upsetting traditional notions of how a factory should be built . . . what it really is . . . and what it should do.

see our catalog in Sweet's or write for copy

A Butler metal factory building costs less and can be erected weeks faster than conventional structures. Of all industrial buildings, it can be expanded easiest and most economically.

Be sure to get the full story from your nearby Butler Builder. (See "Buildings" in the Yellow Pages of your phone book or write to Butler). Ask him to show you the new Butler factory planning film.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7375 East 13th Street, Kansas City 26, Missouri

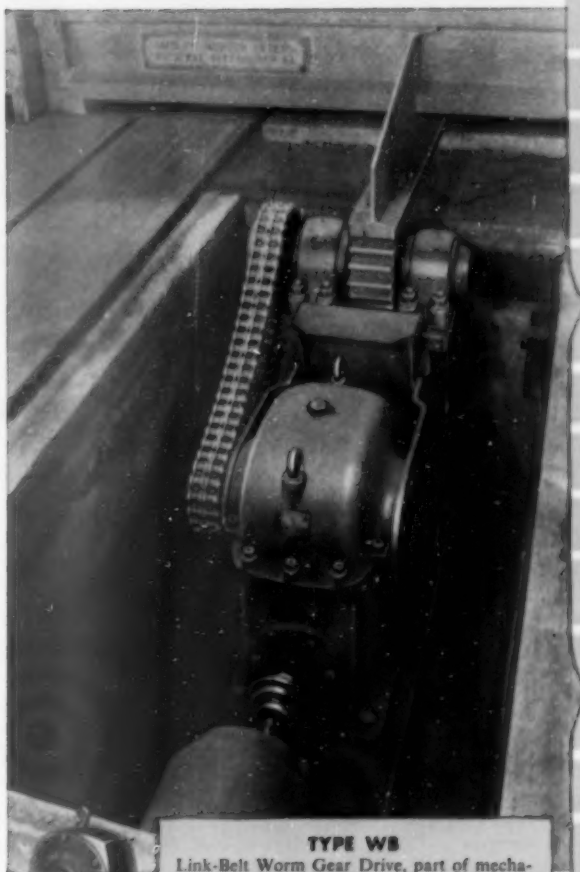
Manufacturers of Steel Buildings • Oil Equipment • Farm Equipment • Dry Cleaners Equipment • Outdoor Advertising Equipment • Special Products

Sales offices in Los Angeles, Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • New York and Syracuse, N. Y. Washington, D. C. • Burlington, Ontario, Canada

Arrange high-ratio speed reduction in least space from

these 4 and 15 more

LINK-BELT Worm Gear Drives

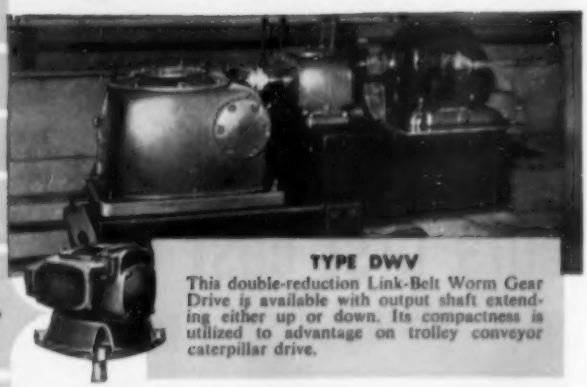


TYPE WB

Link-Belt Worm Gear Drive, part of mechanism for moving cars in and out of annealing furnace, has a single reduction with worm below gear and horizontal output shaft. Link-Belt makes all components for complete drives, including roller chain and bearings used here.

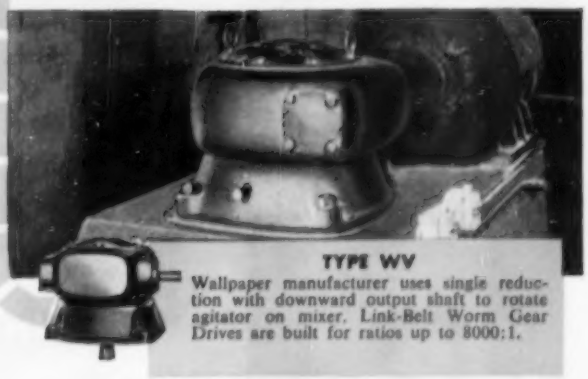
TYPE HWB

Consisting of a helical gear first reduction and worm gear final reduction, with worm below gear and horizontal output shaft, this drive helps power car haul in a steel mill.



TYPE DWV

This double-reduction Link-Belt Worm Gear Drive is available with output shaft extending either up or down. Its compactness is utilized to advantage on trolley conveyor caterpillar drive.



TYPE WV

Wallpaper manufacturer uses single reduction with downward output shaft to rotate agitator on mixer. Link-Belt Worm Gear Drives are built for ratios up to 8000:1.

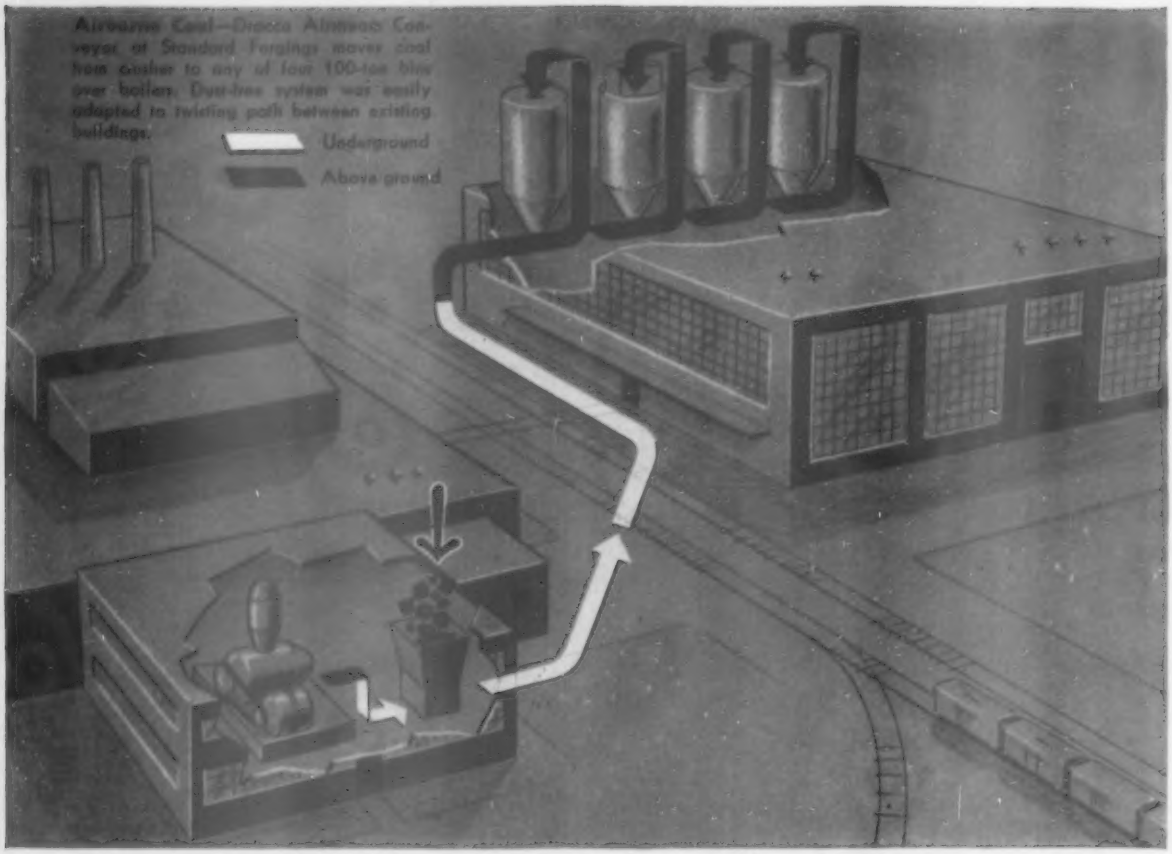
ADD to basic compactness the application flexibility offered by 19 types — and you'll find the perfect mating of speed and need in the complete Link-Belt line of Worm Gear Drives. For selection guidance and full data, ask your Link-Belt office or authorized stock-carrying distributor for 80-page Book 2324-A.

LINK-BELT

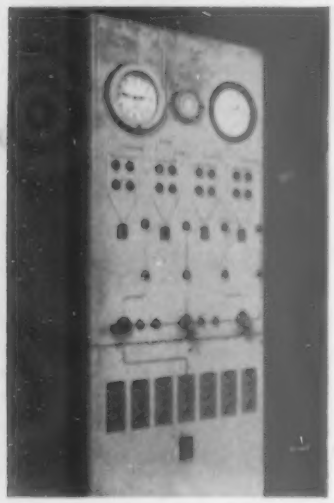
ENCLOSED GEAR DRIVES

14,744

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.


Airstream Coal—Dracco Airstream Conveyor at Standard Forgings moves coal from crusher to any of four 100-ton bins over boilers. Dust-free system was easily adapted to twisting path between existing buildings.
Underground
Above ground

conveying coal by *Airstream* cuts first cost 60%, saves $35,000 per year



Control Station—One man operates complete Dracco coal handling system from graphic control panel. Lights show flow path, switches permit remote control.

In a recent modernization program, Standard Forgings Corp., East Chicago (Ind.) installed a Dracco Airstream Conveyor to handle coal from crushers to boilers. This move has paid off in a big way—first cost was 60% less than an all-mechanical conveyor . . . savings in coal and other costs have piled up at the rate of over $35,000 per year!

Compared with the old system, here are the Dracco-introduced improvements–one operator controls system . . . daily coal requirements moved in one shift instead of three . . . use of lower grade coal costing one dollar less per ton . . . annoying, costly and potentially dangerous coal dust problem licked.

With an automatic Dracco Airstream Conveyor, coal is transported at 30 tons per hour through a dust-tight system. One operator, aided by bin-level indicators and remote-controlled diverter gates, controls all handling from a central switch panel. There is no waste, loss or spillage of coal. System maintenance is practically zero.

If you handle coal or any other dry bulk material, you can move it anywhere . . . with less labor . . . lower material cost . . . and no dust, danger or contamination with an Airstream Conveyor. Call in a Dracco engineer today.

DRACCO CORPORATION

4075 East 116th Street · Cleveland 5, Ohio

Dracco Bulletin 529, "Airstream Conveyors", contains detailed information on equipment and uses. Shows examples. For your copy, write Dracco today.

DRACCO *Performance Proved*

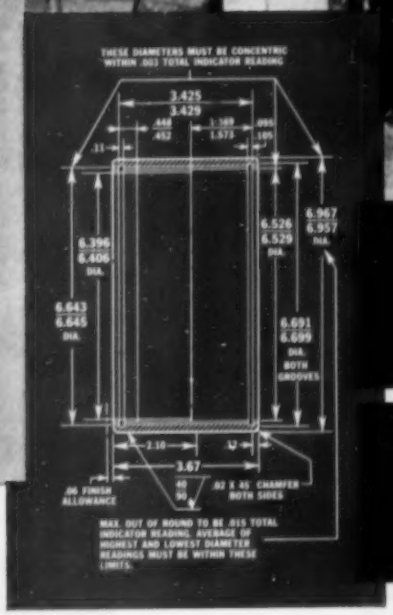
Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

Automobile Manufacturer produces

Repetitive Pieces to Close Tolerances with

BULLARD MULT-AU-MATIC Type "L"

At one of the nation's largest automotive plants, a number of Bullard Mult-Au-Matics, Type "L" are employed to produce automatic transmission parts. According to the Process Engineer "The transmission is the most precision piece of equipment in the entire car — with many moving parts fabricated to close tolerances."



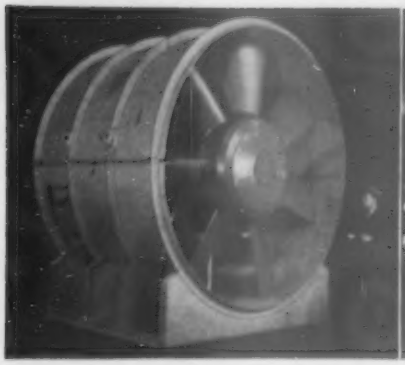
If you have need to manufacture to exacting tolerances it will pay you to investigate the many advantages offered by Bullard Mult-Au-Matic, Type "L".

Send for catalog today

THE
BULLARD
COMPANY
BRIDGEPORT 9, CONNECTICUT

THE BULLARD COMPANY
286 CANFIELD AVENUE — BRIDGEPORT 9, CONNECTICUT
Please send me a copy of the
NEW MULT-AU-MATIC, TYPE "L" CATALOG

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____



Special large-size "Buffalo" Axial Flow Fans are used for high-volume, medium-pressure work where space is limited.

Many arrangements are possible, as illustrated by this compact 4-fan unit used for large-area cooling.

"Buffalo" Vaneaxial Fan with motor in housing — an extra compact arrangement. Also available in Tubeaxial models (without guide vanes).

WHERE YOU'LL GET BEST AIRESULTS WITH "BUFFALO" AXIAL FLOW FANS

"Buffalo" Axial Flow Fans were developed to give highest efficiencies at pressures up to 5" and with straight-line air delivery (not installed next to duct elbows). In capacities up to 115,000 cfm, they offer the advantages of light weight, compact size and real flexibility for installation requirements.

FOR DUCT-MOUNTING, their shape and size permits fitting them in like a section of duct — and they aren't heavy enough to require massive foundation or structural support. You can mount them vertically for hood or roof exhaust — or horizontally, to boost capacity in a system. "Buffalo" Axial Flow Fans are much more than "Propeller fans in a duct". Their "Q" Factor* design includes airfoil wheels with blade pitch changing from hub to tip for smooth air flow-guide vanes in the Vaneaxial models to straighten air leaving the wheels — limit-load characteristic to permit selection of fan size close to motor capacity without fear of overloading — sturdy, rigid fan housing to eliminate vibration — many other features described in *Bulletin* 3533. Request your copy today.

"Buffalo" Vaneaxial Fan with motor outside of housing — out of air stream. Note streamlined belt fairing, removable cap over pulley.

Vertical exhaust is a "natural" for "Buffalo" Axial Flows because of their light weight, duct size and shape.

*The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

DROODLES

by ROGER PRICE

Bench Model BC-7D

Floor Model FC-30

Floor Model FC-14

Table Model TC-14
(Vertical Inspection)

"HIGH-STRUNG ENGINEER"

This cleverly-drawn Droodle is just a joke, because everyone knows that engineers really aren't high-strung at all. They're all rugged, handsome, good-natured chaps who puff placidly on bulldog briars while they're doping out various ways to square the circle, and how to get another year out of the family jalopy. Oh yes, I was an engineer once! Until one day the boss, who was inspecting one of my blueprints, remarked "Price, you're funny!" On the spot, I decided to become a humorist. That's the very same spot I was fired on, incidentally.

Not at all incidentally, I'd like to put in a good word for a friend of mine, the Jones & Lamson Optical Comparator. This precision-built instrument is used throughout industry to inspect and measure all sorts of parts and objects. The J&L Comparator is speedy, and accurate to .0001". It's extremely flexible, too . . . can be used for the toughest inspection jobs, and pays its own way both in production-line and job-shop work. Available in eleven bench and floor models. Get all the details on Jones & Lamson Comparators . . . write to Dept. 710 *today*.

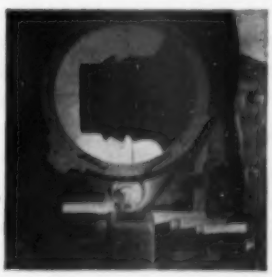
JONES & LAMSON OPTICAL COMPARATORS *On the Job . . .*

at Ingersoll-Rand Company, Phillipsburg, N. J.

A J&L Comparator performs production-line inspection of form tools and gages. This helps to minimize scrap, and insures top quality in the manufacture of rock-drilling equipment.

at A. H. Wirz Inc., Chester, Pa.

A J&L Comparator checks the necks, threads and other elements of the many different sizes and types of fold-up metal tubes, that are used for cosmetics, pharmaceuticals, etc.



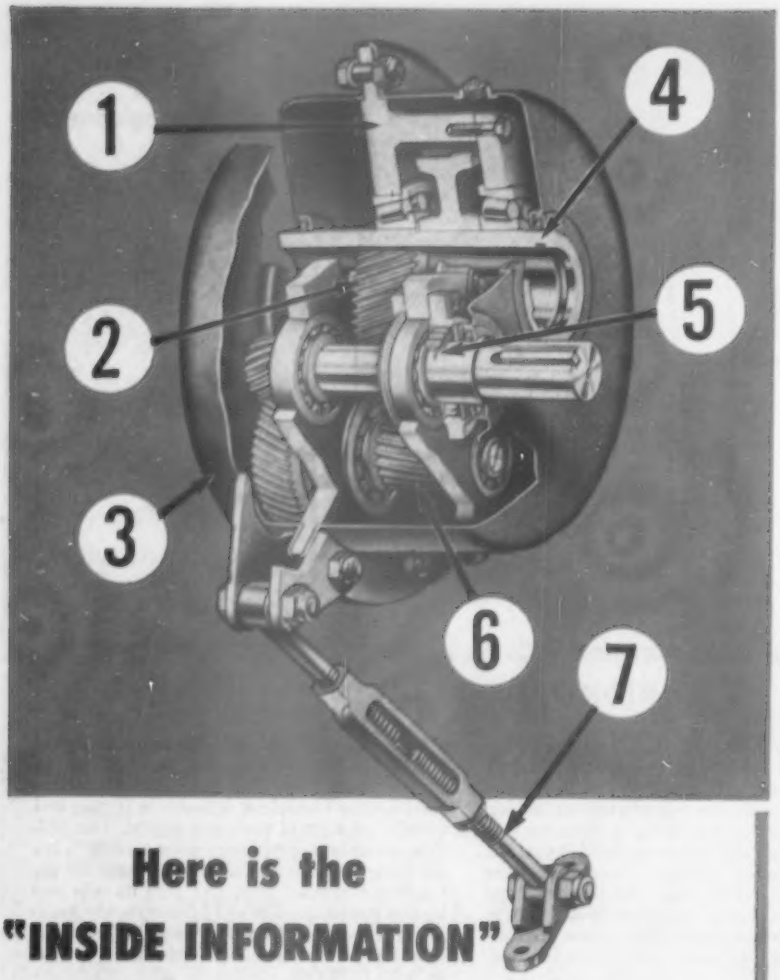
JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 505 Clinton Street, Springfield, Vt., U. S. A.

Please send me Comparator Catalog 402-C, which describes the complete line of J&L Optical Comparators.

name _____ title _____ street _____

company _____ city _____ zone _____ state _____



Here is the "INSIDE INFORMATION" on FALK ALL-STEEL Shaft Mounted Drives

Take a careful look inside the Falk all-steel Shaft Mounted Drive, and you will know why this newest member of the famous Falk family is ideal for applications where direct mounting on the driven shaft is desirable. It is the only drive in its field with all these superior "In-built" factors:—

1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

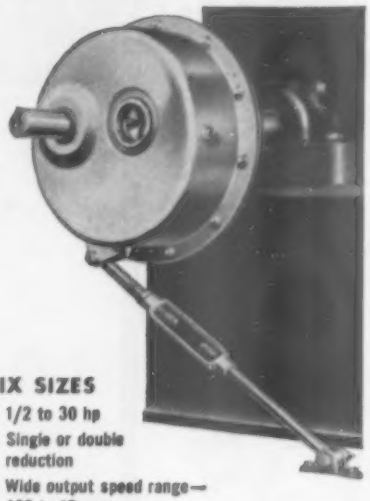
5 **Backstop** can be furnished with the unit or added later for positive prevention of reverse rotation.

6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

Write to Department 247 for engineering bulletin, including selection and dimension details.

EFFICIENT SPEED REDUCTION IN LIMITED SPACE

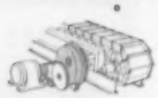


SIX SIZES

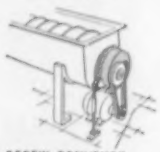
- 1/2 to 30 hp
- Single or double reduction
- Wide output speed range—420 to 10 rpm

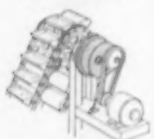
Expressly designed for topflight performance on installations requiring considerable speed reduction in limited space, the all-steel FALK Shaft Mounted Drive has quickly won acceptance throughout industry. This sturdy, compact, versatile reducing unit is an ingenious variation of the highly successful FALK Motoreducer design, pacemaker in its field for more than 20 years. Here, the time-proved design is adapted for mounting directly on the shaft to be driven, using V-belt connection to motor. Investigate now!

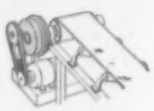
A FEW TYPICAL APPLICATIONS

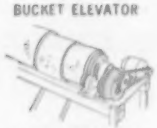

APRON FEEDER

LINE SHAFTING


SCREW CONVEYOR


BUCKET ELEVATOR


BELT CONVEYOR


GRAVEL CLASSIFIER

THE FALK CORPORATION, Milwaukee 8, Wisconsin

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

Becton, Dickinson and Company, East Rutherford, N. J.; Architect: Fellheimer & Wagner, New York, N. Y.; Contractor: Mahoney Troast Construction Co., Passaic, N. J.

Precision workmanship demands controlled daylighting

Owens-Illinois Glass Block eliminate glare, cut maintenance costs, provide better light all day long...

Owens-Illinois Glass Block won't rust, rot or corrode...are hard to break...almost eliminate maintenance costs . . . permit use of large glass areas without excessive heat loss.

At Becton, Dickinson and Company, good vision is a "must" because B-D thermometers, hypodermic syringes, needles and other physicians' supplies are made to close tolerances and must pass exacting performance tests.

In B-D's new East Rutherford, N. J., plant, panels of Owens-Illinois Glass Block provide a natural solution to lighting problems by directing daylight upward and diffusing it over all parts of the plant all day long. Brightness is kept at comfortable levels, excessive glare and harsh contrasts are eliminated. Room temperatures are easier to regulate because Owens-Illinois Glass Block insulate so efficiently.

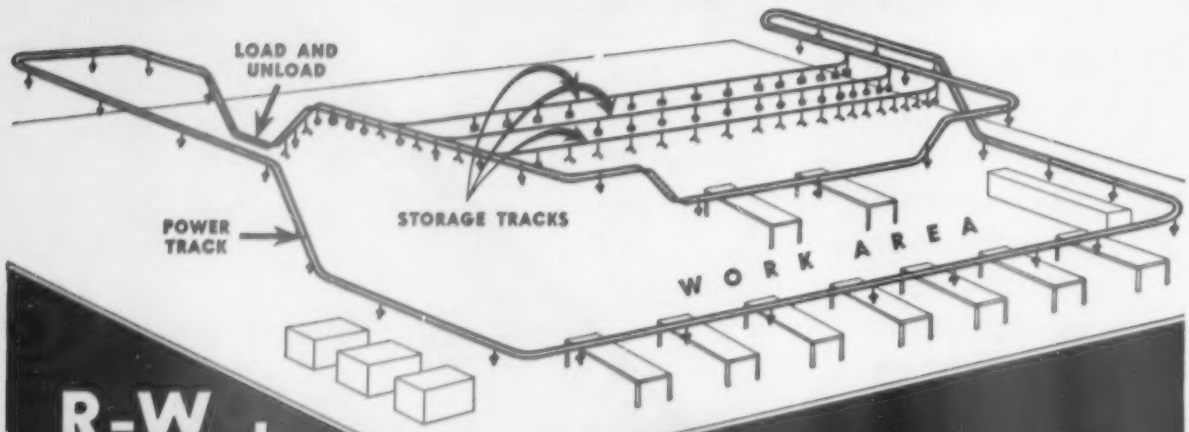
Owens-Illinois Glass Block are available in a wide variety of designs from super-clear that you can see through to those that restrict sight completely. If you are in the process of remodeling old structures or building new ones, don't overlook the maintenance economies and better seeing conditions that panels of Owens-Illinois Glass Block can bring to your plant.

For information, write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. FM-11, Toledo, 1, Ohio.

OWENS-ILLINOIS GLASS BLOCK
AN (O) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

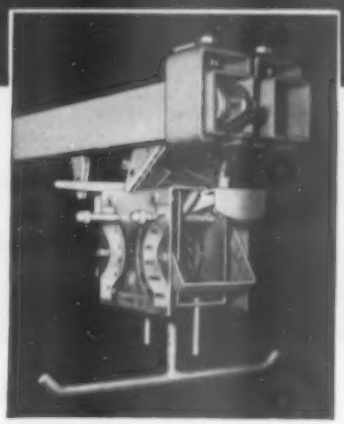
NOW! a "factory-wide" production and storage automatic selective conveyor system!



R-W TWIN-TRAK TRADE MARK OVERHEAD *Automatic* DISPATCH SYSTEM

The unique R-W "TWIN-TRAK" Automatic Dispatch Systems offer a new concept of efficient and economical handling of materials. This system not only moves materials from one point to another but will automatically and economically transfer products to a predetermined work station or storage area. Storage banks may be installed in the "free" area under the building trusses and valuable floor space can be released for production operations. Products may be automatically moved from the storage banks to work stations as they are required.

R-W "TWIN-TRAK" systems, composed of tried and proven standard R-W conveyor component parts, may be economically added to present "Zig-Zag" conveyors. Many conveyors may now be integrated into one automatic, factory-wide conveying system. Call your local R-W Conveying-Engineer today . . . let him show you how an R-W "TWIN-TRAK" System will reduce operating and overhead costs, increase production efficiency and provide added profits.



An R-W "TWIN-TRAK" System consists of one or more power tracks and as many storage or free tracks as desired. Available with efficient, economical manual or electronic selective controls designed to effectively meet your specific requirements.

Outstanding Advantages

- **Provides trouble-free, automatic-selective control over product movement through entire plant.**
- **Economical and practical . . . provides added storage space . . . saves time, labor and money.**
- **Automatically supplies component parts to work stations from storage banks or lines.**
- **Economical to install . . . extremely flexible . . . quickly and economically revised or modified to meet your changing needs or future expansion plans.**
- **Ideal for conveying and dispatching products in multiple story buildings.**
- **Designed, manufactured and backed by the leading firm in this field for over 75 years.**

WRITE TODAY for complete information . . . request Catalog No. F-192.

Richards-Wilcox
MANUFACTURING COMPANY
Materials Handling Division

75 YEARS of QUALITY and SERVICE by RICHARDS WILCOX

410 W. Third St. • Aurora, Ill. • Offices in Principal Cities

Sliding Door Hangers & Track • Fire Doors & Fixtures • Garage Doors & Equipment • Industrial Conveyors & Cranes • School Wardrobes & Partitions

First with NEW "Automatic" Service

Cone was the first builder of multiple spindle automatics to provide machine users with an experimental service in the application of carbide tools.

This service is a practical means of determining the possibilities of carbide tools for production men without loss or interference with their regular production schedules.

A pamphlet "FOUR STEPS WITH CONE" describes this service. Send for your free copy.

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.

Sand and Ground Glass Solution

60 feet straight up

with dependable De Laval CPO Pumps

These De Laval CPO Pumps are at work 24 hours a day, 7 days a week

Here's proof of the dependability of De Laval CPO Pumps. In one large automotive company, glass grinders work 24 hours a day, 7 days a week virtually every week in the year. They cannot grind without the sand and ground glass polishing compound which must be pumped 60 feet straight up and over to a grinding room. Says the supervisor, "We have encountered no trouble at all, nor has there been any downtime for the grinders due to the pumping operation."

These pumps have cast iron casings with De Laval KK-20 (20-28 stainless) internals. This superior metal is also being used successfully on other problem fluids which require KK-20 for the casing as well.

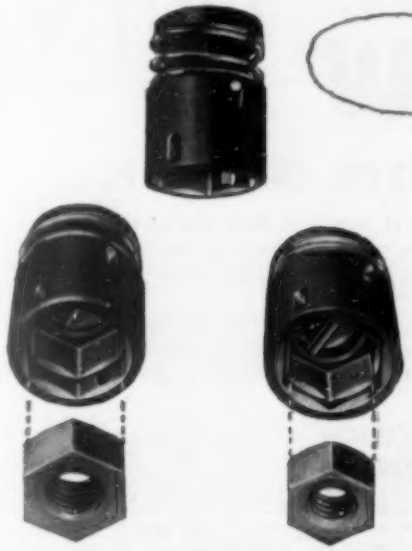
Three bearing pedestals accommodate nine wet end sizes of the De Laval CPO, and changes in size or metallurgy can be made *after* installation with off-the-shelf parts. Either conventional or mechanical seals are available.

Write for Bulletin 1125-B

DE LAVAL *CPO Process Pumps*

DE LAVAL STEAM TURBINE COMPANY
804 Nottingham Way, Trenton 2, New Jersey

DL 349



This Apex "2-in-1" spring-loaded impact socket is used interchangeably to run down ¾" and ⅞" hex nuts on automobile engines. It eliminates constant changing of tools, helps step up production. As an additional feature, socket may be turned end for end to double working life.

This Apex Spanner-type socket has four internal driving lugs to engage the four openings in the flange-type nut. It eliminates the customary external prongs that frequently break off and slow down assembly operations. Socket seats nuts quickly and easily in a difficult location inside an automatic washer.

The true cost of any tool will show up in production records, not just on the price tag. The amount of work a tool can do efficiently is far more important than the original tool cost.

For example, each of these special Apex sockets was designed to solve an unusual fastening problem. For this reason alone, these tools have proved well worth their original price. In addition, these tools have provided substantial savings in production time and expense—that's why the true cost of Apex tools is always lower.

When your production or maintenance work involves nut running or screwdriving, you can keep costs down with Apex tools. There are more than 7,500 stock types and sizes of Apex tools for every nut running or screwdriving job. And, if yours should be a special fastening problem, we'll work with you to develop a special tool exactly suited to your needs.

Apex—the authority on fastening—offers creative engineering and specialized manufacturing experience that will help solve your fastening problem. Our new Pocket Catalog is ready—may we send you a copy?

Ask **APEX** *for the answer to your fastening problem!*

THE APEX MACHINE & TOOL COMPANY

1025 S. Patterson Blvd. • Dayton 2, Ohio

What's New

IN STEEL FROM STOCK

In the news today are many developments of interest to those who specify, buy or work with steel. Ways in which you can raise efficiency and lower costs in your operations may be suggested by the following summary.

NEW IN RYERSON STOCK—Cold finished Ledloy hexagons in sizes up to 3". (Previous maximum size: 1½".)...Welded, square, structural tubing with a lighter wall. Advantages: Costs less yet has all the strength, good surface, etc., needed for ornamental applications.

NEW TYPE 202 STAINLESS NOW AVAILABLE FROM RYERSON—Pioneering with a new type of stainless steel, Ryerson now offers Type 202 sheets, No. 2B and No. 4 finishes in popular gauges and sizes, for quick shipment from stock. Since nickel may continue in short supply for some time, interest in this new stainless has been strong. Reasons: Type 202 contains only half as much nickel as Type 302 yet compares favorably with 302 in corrosion resistance, fabricates as readily as 302 and costs 2¢ per lb. less.

WHAT ABOUT HOT ROLLED BARS? A leading metal-working publication recently listed hot rolled carbon steel bars as a hard-to-get product—but this is not the case when you draw on Ryerson stocks. Our inventories of hot rolled bars have seldom been better, both as to tonnage and size range.

NEW, ACCURATE I.D. ON CYLINDER TUBING FROM STOCK—In hydraulic cylinder applications, the I.D. is the critical tubing dimension. Yet, until now, buyers of tubing from warehouse stocks could specify only O.D. and wall—and wall thickness may vary as much as plus or minus 10% under standard manufacturing tolerances. As a result, I.D. dimensions could vary so widely that tubing was not suitable for cylinder use. But now buyers may specify both O.D. and I.D. when ordering cold drawn seamless tubing from Ryerson (in 2" through 9" O.D. sizes)—thus assuring the accurate I.D. dimensions needed for cylinders. We believe we are the only warehouse to carry this stock.

REPORT ON NEW E-Z-CUT PERFORMANCE—New proof of the quality of Ryerson's leaded plate steel, New E-Z-Cut, was reported by company which recently made a mold for a miniature tire. Some of the tiny lands forming the tread design were only .015" thick but $30 worth of New E-Z-Cut took the risk out of the $4000 machining job. Because New E-Z-Cut is remarkably clean and free of excessive stringers, even the finest lands of the mold were sharp and true. Because New E-Z-Cut machines up to 30% faster than mild steel, the difficult job was completed in record time. High finish made the mold easy to prepare for plating.

FLUID LINE TUBING WITH IMPROVED FINISH—Another new Ryerson product is Hydra-Luster hydraulic fluid line tubing which has an unusually beautiful finish, free from scale and surface defects because of a new method of atmospherically controlled annealing. This tubing is on hand in all sizes through ¾" O.D. x 16 gauge wall.

PVC PLASTIC PIPE IN LARGE DIAMETERS—8" and 10" pipe in both schedule 40 and 80 have been added to growing Ryerson stocks of the remarkably anti-corrosive plastic—Ryertex-Omicron polyvinyl chloride. Also available: smaller size of pipe, fittings, sheets and rods. For complete data on properties, resistance to more than 300 chemicals, etc., write for technical booklet 80-3.

RYERSON CERTIFIED QUALITY

JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • WALLINGFORD, CONN. PHILADELPHIA • CLEVELAND • CHARLOTTE • CINCINNATI • DETROIT • PITTSBURGH • BUFFALO CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

FACTORY
MANAGEMENT AND MAINTENANCE

PRESS TIME REPORT
NOVEMBER 1956

Looking Ahead in Business

One mildly disturbing note has crept into the business outlook for next year. The University of Michigan Survey Research Center noted in its latest survey that the consumer's zest for buying "big ticket" durables has tapered off since April.

It's not that the consumer has suddenly become uncertain of his income prospects. On the contrary, he is feeling prosperous this year, and in general expects to feel even more so next year.

Statistics indicate he is justified. Personal income has been climbing steadily all year. There are indications, too, that he has been saving more—6.6% of his income during the first quarter, 7.4% in the second—which adds to his feeling of well-being.

In view of the consumer's solid position, it is surprising that his plans to spend have been trimmed down. Plans to buy houses are off sharply from last spring. Plans to buy autos are up only slightly, as are some durables—refrigerators and TV. But some other big durables are down.

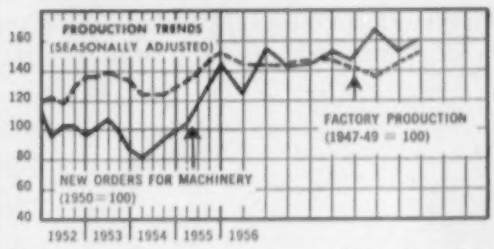
One factor that accounts for the dip in consumers' plans to buy houses is very likely the shortage of mortgage credit. And the drop in plans to buy some electrical appliances may be explained by the drop in housing starts. But beyond that, consumers got heavily saddled with installment debt in 1955. They have been working it off this year. And, while savings statistics indicate that they have strengthened their financial position, they may be reluctant to think about making new big purchases now.

•

These survey results reflect the consumer's opinion during August and early September. He can change his mind. And maybe he will when he sees the new cars or the improvements in other big durables. When he does, he can back up his change of mind with ample purchasing power.

The consumer was a disappointment to retailers last month. Retail sales that have been a stout pillar beneath the economy this year dropped off 2% in September on a seasonally adjusted basis. However, a large part of the drop was in auto sales. Generally, retail sales pick up as we move into the Christmas season. The September performance does not dim the prospects for the final quarter.

FACTORY FIGURES OF THE MONTH



Indicator	Sept.[p] 1956	Aug.[r] 1956	Sept. 1955
New Orders for Machinery (exc. elec.)[1]	160.0	153.0	143.0
Contracts for Industrial Construction[2]	195.0	219.0	152.0
Factory Production[3]	146.0	143.0	144.0
Consumers' Prices (cost of living)[4]	117.1	116.8	114.9
Industrial Prices (materials, supplies)[4]	122.9	122.5	118.5
Manufacturing Employment (millions)[4]	17.1	17.0	16.9
Total Employment (millions)[5]	66.1	66.8	64.7
Unemployment (millions)[5]	2.0	2.2	2.1

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

The problem of getting money for improvements and expansion is still bedeviling businessmen. Money is tight and is likely to remain that way for a time. Interest rates, aside from mortgage rates, are at higher levels now than they have been at any time since the early 1900's.

Furthermore, the Fed is not likely to switch signals to ease the way for either business or individual borrowers. Prices for a good many fabricated metal products are currently undergoing a strong upward thrust. And the consumer as well as the purchasing agent is beginning to feel it. Higher price tags will be attached to a good many consumer items, including electrical appliances and men's clothing.

•

In spite of the consumer's hesitancy and tight money, the underpinnings of the economy are still strong. Industry in most lines is turning out goods at top speed, has sure enough markets to tack on price increases. The consumer may make the salesman work harder next year, but there is no reason to think he will kick off a recession.

FACTORY
MANAGEMENT AND MAINTENANCE

PRESS TIME REPORT
NOVEMBER 1956

Ideas of the Month

Protokaps will guard pipe and tubing against corrosion during storage. They're neoprene end caps (made by Protokap, Inc., 625 West Bldg., Houston, Tex.) that seal out air, moisture, fumes, dirt—and mice, if any.

Better getta Burn Basket (Bennett Mfg. Co., Alden, N. Y.) to hold those classified or confidential papers you're going to burn. Tamper-proof.

Electriduct is a new, over-the-floor extension cord (Ideas, Inc., 615 S. 2nd St., Laramie, Wyo.). Non-slip. And stumble-proof. One end plugs into a wall outlet. The other has a two-way receptacle.

Basaltwool possesses unusual acoustic and heat-insulating properties. Produced in Sweden, Batts are now available in densities from 3 to 6 lb. per cu. ft.—and in widths and thicknesses suitable for most applications—through Thermo-Sound Products, 10816 E. Fawcett Ave., El Monte, Calif.

Those wood-block floors need resetting, repairing, or resealing? Then that new improved Blockset (The Monroe Co., 10703 Quebec Ave., Cleveland 6) is for you. It comes factory-mixed and ready to use. No fire hazard. No noxious fumes. No interruptions to production.

Signet 40 is that new, moderately priced 35mm camera (Eastman Kodak Co., Rochester 4, N. Y.) that has absolutely everything your plant photographer needs to take good black-and-white or color shots in the plant. The $65 price includes flashholder and two reflectors.

Must be places in your plant where you can use that new porcelain-enameled aluminum foil. Name your color. Won't crack, even when bent around corners. Aluminum Co. of America, 1655-J Alcoa Bldg., Pittsburgh 19.

Slickest pen yet seems to be the new Parker that fills all by itself. No moving parts. Just remove the cap and dunk. Capillary attraction does the rest, we guess. Anyway, no more inky fingers. Retails for $22.50 and up.

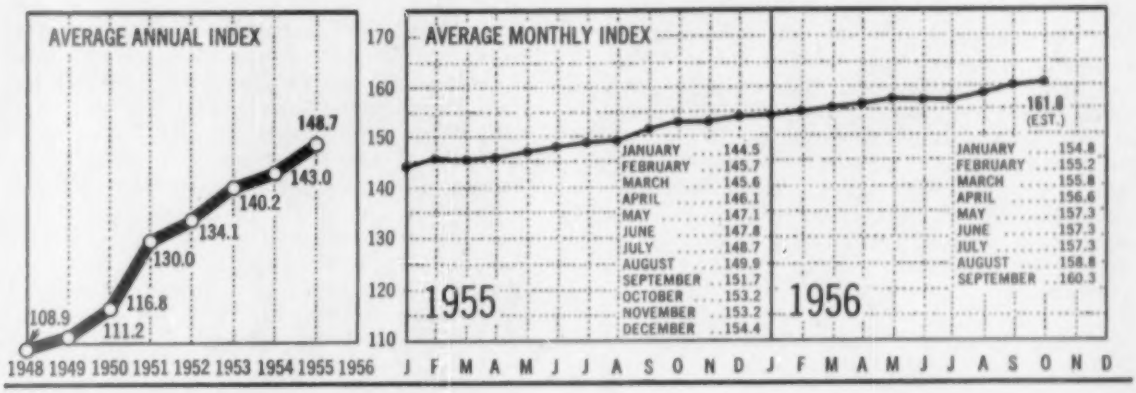
Your soldering problems will be over—as soon as you get one of those flux kits (Alpha Metals, 56 Water St., Jersey City, N. J.). Kit contains 16 of the most recently advanced fluxes for electronic assemblies, printed circuits, tinning and hot solder dipping, stainless steel and aluminum soldering. Enables production men to determine which flux for which job.

More Ideas of the Month on pages 110 and 111

FACTORY
MANAGEMENT AND MAINTENANCE

PRESS TIME REPORT
NOVEMBER 1956

Cost Index of Plant Maintenance



Costs Shooting Up Again!

Inflationary pressures continue to push factory maintenance costs higher.

FACTORY'S Cost Index of Plant Maintenance shot up again in September as the inflationary pressures that were building up last spring continue to work their way through the economy. These pressures have not yet spent themselves, and it seems likely that the Index will continue to rise at least through the end of the year.

Price increases asked for some fabricated metal products were especially sharp. Manufacturers of bolts, nuts, and screws have raised prices by an average of 7% during the past month. Producers of chain have added 6% to their prices; producers of bearings, 5%. This reflects the spreading impact of the steel price increases of last August—which are gradually working their way into the over-all price structure.

Other price increases this month affected solder, (2%); lubricants, (2%); electrical controls, (1%); alloys, (1%); and belting, (1%).

Wages also rose sharply. Hourly rates are moving up across the board. In recent months they have moved up most sharply in the building trades. This is primarily the aftermath of a flurry of contract agreements signed earlier in the year. And to some extent it also includes overtime rates that have become more common during the summer months when weather favors the builder.

The net effect of the increases in both prices and wages was to raise the Index 1.6 points. The Index has increased by 4% since last January.

	AVERAGE 1955	SEPTEMBER (Preliminary)	AUGUST (Revised)
Building and Facilities Index	**143.6**	**152.8**	**152.4**
Materials	130.7	139.7	139.1
Brick	137.6	146.9	146.9
Elec. fixtures	120.0	128.7	128.7
Elec. switches, boards, fuses	152.5	163.3	161.6
Elec. wire, copper	156.2	169.5	169.5
Glass	143.2	152.6	150.1
Gutters, spouts, ducts	152.5	169.1	169.1
Gypsum products	129.2	134.5	134.5
Heating equipment	120.7	127.0	125.0
Lumber	131.7	133.2	134.5
Millwork	147.5	148.0	148.4
Paint	116.1	120.8	120.8
Pipe, cast iron	144.4	161.2	161.2
Pipe, steel	157.9	184.0	184.0
Pipe & tubing, copper	161.6	175.5	175.5
Roofing	112.7	124.9	124.9
Sanitary fixtures	147.3	151.4	151.4
Sash, metal frame trim	144.5	153.7	152.8
Solder	119.7	127.7	124.8
Steel, structural	179.8	201.9	201.9
Tanks, steel	126.6	140.2	138.7
Valves & fittings	137.9	155.8	152.1
Wire mesh	161.2	169.8	167.5
Labor	152.3	161.2	161.2
Carpenters	144.7	150.3	150.3
Electricians	154.3	165.9	165.9
Painters	157.9	167.5	167.5
Equipment Index	**151.1**	**163.7**	**161.5**
Materials	144.4	161.0	156.8
Abrasives	132.5	142.3	142.3
Alloys, non-ferrous	138.8	144.4	143.1
Bars & plate, steel	184.9	205.6	205.6
Bearings	146.1	164.5	156.3
Belting	143.6	153.2	151.8
Bolts, nuts & screws	181.0	204.5	191.2
Chain	152.6	171.6	161.8
Controls (electrical)	146.3	163.3	161.6
Gear-reduction units	147.8	163.4	163.4
Hand tools, mechanics	164.0	179.0	179.0
Lubricants	65.8	82.7	80.9
Motors	124.1	136.6	134.8
Non-ferrous metals	137.0	151.2	151.2
Precision tools	136.7	143.2	143.2
Pumps	148.3	169.0	169.0
Tools, cutting	142.6	154.6	152.4
Valves & fittings	137.9	155.8	152.1
Labor	155.6	165.5	164.7
All mfg. labor	152.1	161.7	160.1
Machine tool labor	159.0	169.2	169.2
FACTORY's COST INDEX	**148.7**	**160.3**	**158.8**

FACTORY
MANAGEMENT AND MAINTENANCE

PRESS TIME REPORT
NOVEMBER 1956

Looking Ahead in Labor

New clues to productivity—the No. 1 issue of the bargaining table—are being revealed. While this issue, and its tie-in with labor's demands, has been on the negotiating scene for over a decade, it's one of the least understood of bargaining items. Now the government has come up with a study that provides clues to what makes up productivity—and why. For management, it's important to know as much about the subject as possible, both in shaping answers to contract demands and in initiating bargaining yardsticks.

The study (by the U. S. Labor Department) is limited to the steel industry. But it contains the essential points that can be applied to all industry. What has happened to steel production over the past 10 years may not match, figure-wise, the advanced output of, say, the auto industry, but the reasons for the change in productivity are the same. And there are some surprises showing up.

One key point—productivity fluctuates widely year by year. In bargaining, the increase in output is usually discussed in percentage terms indicating a steady climb of 3% or so. But the output advance doesn't work that way. It may average out at 3% but a wide variety of figures go into that average. In steel, for instance, productivity dropped in 1953; last year it climbed by 11.4%.

What causes the differences? Just one thing—business conditions. An industry or company output record increases as volume of business advances, and vice versa. The higher the percentage of capacity in use, the greater the output. In other words, there's a direct relationship between fuller use of equipment and production record per worker. The mild recession of 1953 forced the steel industry to work a cutback schedule, and productivity suffered accordingly.

•

While productivity fluctuates with the business cycle, there is an underlying steady advance due to technological changes. The year-by-year introduction of new equipment is the long-run factor that causes an increase in productivity. In the steel industry, the increase in size of blast furnaces is one of the latest factors in the steady rise. And new equipment doesn't always mean an increase in production levels; steel output was about the same in 1941 and 1949, but productivity was up 18% in the latter year.

Morale is a third factor in the advance of productivity. Employees who show a willingness and capacity to learn new jobs, to change with changing production methods, help the productivity rise. In part, the government report says, the workforce attitude is tied to good wages, the security of pensions and welfare funds, leisure time, and incentive pay plans.

The report does not attempt a formula on how the benefits of productivity should be shared—how much should go to the workers and how much should be translated into price cuts. That, at least in part, is a matter for bargaining between labor and management. But one thing is true. In any yearly contract advance, the wage rise should match as closely as possible the average rise in productivity. Wages that climb beyond that level generally tend to force up prices and become inflationary; payrolls that fall below that level tend to depress the standard of living.

•

New labor-management rules are being made by inaction. The Supreme Court, as its new term gets under way, has declined to take a number of key disputes. These initial decisions by the Supreme Court mean that challenged rulings by the National Labor Relations Board and the lower courts remain in effect. The same issues may come up again in the future, but the Court's decision not to take the cases means that the previous rulings will apply for a year at least. Here are some of the results of the Court's position:

• *While negotiations are in progress, a union may use harassing tactics to win a favorable contract.* The NLRB had held that a union is forbidden from practicing slow-downs, unannounced walkouts, refusal to work overtime as a means of pressuring an employer during bargaining. The court of appeals overruled the board—and that decision now stands. However, while such tactics may be legal, the courts have consistently held a worker may be fired for using them.

• *Employees may be fired for invoking the Fifth Amendment for refusing to answer questions of a government body about Communist activities or espionage.* This policy was challenged by a union which claimed that it did not follow contract grievance procedures. When the Supreme Court refused to take the case, the discharge policy stood.

SEE ALSO LABOR RELATIONS NEWS, PAGE 256

LQ600

NEW HIGH STANDARDS OF VALVE PERFORMANCE!

Fig. LQ600
150 Lb. S. P.
300 Lb. W. O. G.
200 Lb. S. P.
400 Lb. W. O. G.

L 256-39A

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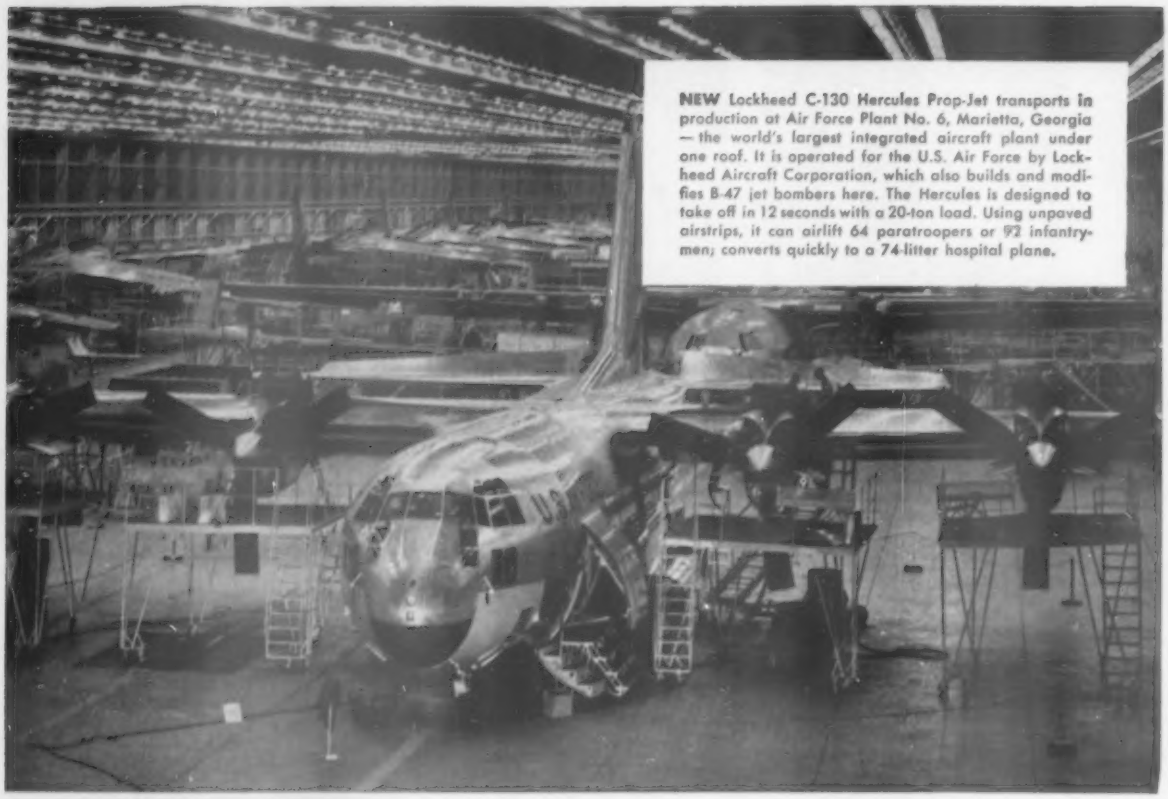
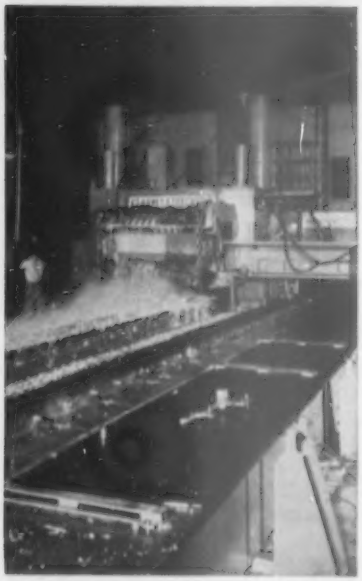


NEW Lockheed C-130 Hercules Prop-Jet transports in production at Air Force Plant No. 6, Marietta, Georgia — the world's largest integrated aircraft plant under one roof. It is operated for the U.S. Air Force by Lockheed Aircraft Corporation, which also builds and modifies B-47 jet bombers here. The Hercules is designed to take off in 12 seconds with a 20-ton load. Using unpaved airstrips, it can airlift 64 paratroopers or 92 infantrymen; converts quickly to a 74-litter hospital plane.



Combination spar and skin miller operating in Lockheed plant. *Texaco Soluble Oil* emulsions are used exclusively in these operations.

How Lockheed keeps production on schedule and reduces costs

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TEXACO Lubricants, Fuels and Lubrication Engineering Service

Are We Ready for the 4-Day Week?

LET'S FACE IT. The 4-day week sounds wonderful to many people. And, as part of our social and economic evolution, we are in favor of it. *But* we think it is hazardous, indeed, to get too excited about it too fast. The grave dangers of hasty, ill-considered action are well outlined in this issue of FACTORY in Associate Editor Carroll Boyce's perceptive analysis of the whole matter. (See pages 84 to 90.)

The idea of a 4-day week has a lot of political sex appeal. Now that big, exciting issues such as pensions and wage guarantees have gained acceptance, there is sure to be growing interest in this big new "issue." Mr. Walter Reuther, shrewd politician that he is, has already leaped on the bandwagon. He is saying that 1958 is D-day for his drive for the 4-day week. He is sure to have considerable support in the ranks of organized labor.

It is significant, however, that men equally devoted to the interests of America's workers and certainly as sincere in their efforts, do not agree with Mr. Reuther. Mr. George Meany, for example, who is technically Mr. Reuther's boss, is far more conservative in his outlook. We doubt that Mr. Meany is any less desirous of doing all he can to improve the lot of the vast membership of the AFL-CIO. Yet he clearly recognizes in a statement to FACTORY (see page 91, this issue) that the real key to achieving the 4-day week is a great increase in our national productivity—output per man-hour. We think Mr. Meany is to be congratulated for his good sense. We wish we could say the same of Mr. Reuther.

Is FACTORY's "go-slow" position on this out-of-date, old-fogeyish? We don't think so. In fact, we're sure we speak for the great majority of people in all walks of life today.

What we want—what we *all* want whether we happen to be management or labor—is *true* social and economic progress. We want living standards to keep on going up. None of us will be satisfied to achieve social progress through depression. And that's exactly what we'll get by seeking to reduce hours of work without corresponding increases in productivity.

What we must have, is true progress through evolution.

How about a 4-day week for management?

While we're at it, let's take a look at work-hours for executives. How typical is the stereotyped picture of the executive who shows up at the office at 10 and leaves at 2 for his golf game? Do you see much of it at *your* plant? Do you get away with any of it yourself?

We'll bet you don't. And we'll bet further that you work like most executives in plant operation, on what in wartime was called an "extended work schedule." In less fancy words that means you put in plenty of overtime.

A recent survey shows that the average top executive works about 14 hours of overtime a week. We suspect their operating subordinates do at least as well—or as badly, depending on how you look at it.

When you talk to men like these about 4-day weeks, you get a pretty sour reaction. They point out that management problems are getting more complicated and are taking more time, not less. And when work schedules get shorter, they see even bigger headaches—and more overtime ahead for them.

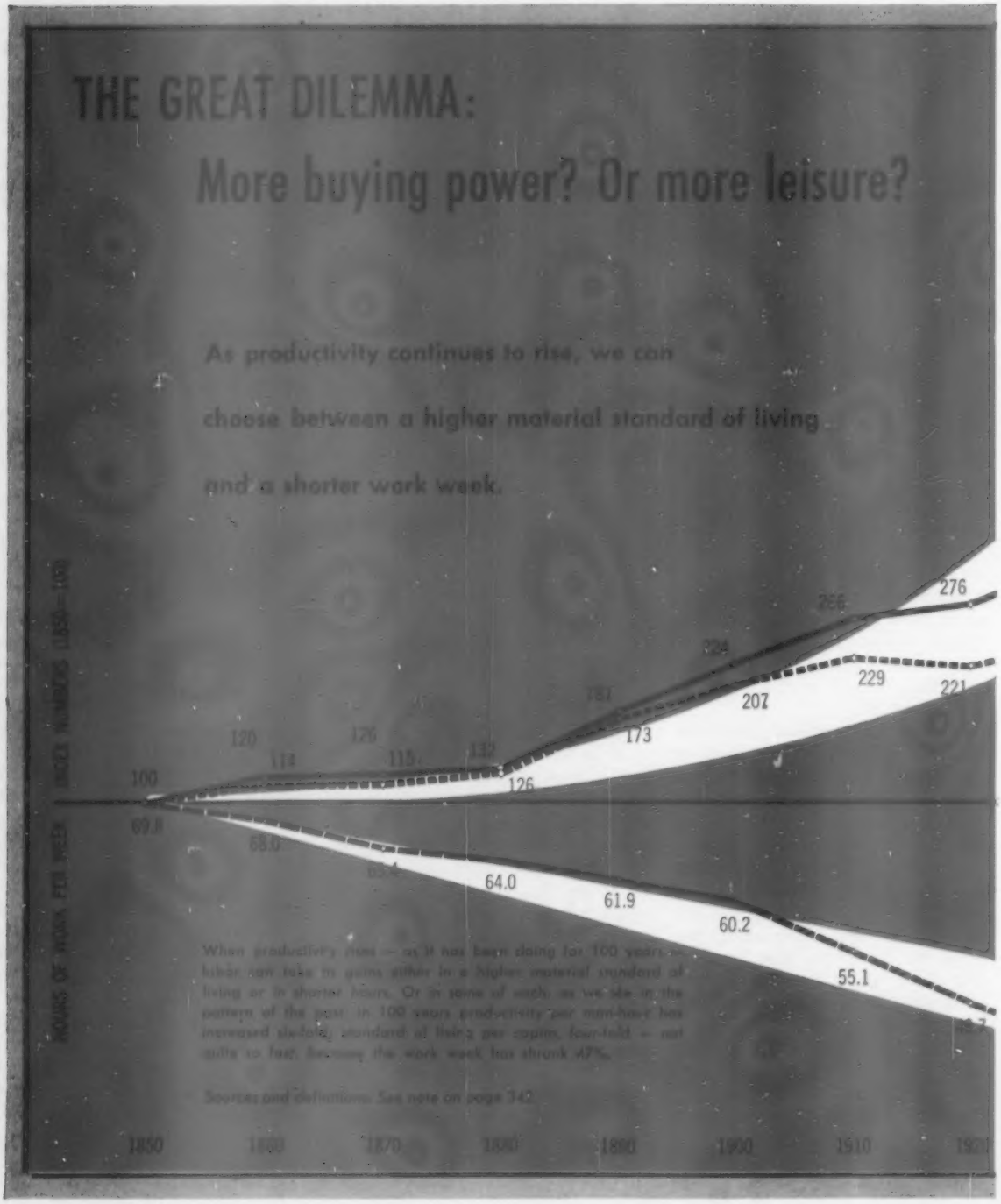
One thoughtful operating man raises this interesting question: Aren't we going to have to take a pretty long look at present vacation and holiday plans for shopworkers when we get around to putting the 4-day week into operation?

"Maybe we'll need some evolution here, too," he suggests, "or maybe even revolution. After all, the average worker will be working only about half of each year what with a 4-day schedule, 2 or 3 weeks of vacation, a certain amount of sick leave, and a whole batch of holidays."

Maybe our worried friend is right. Perhaps the future will find us with so much time off we'll be hard put to use it all. Nobody can tell for sure.

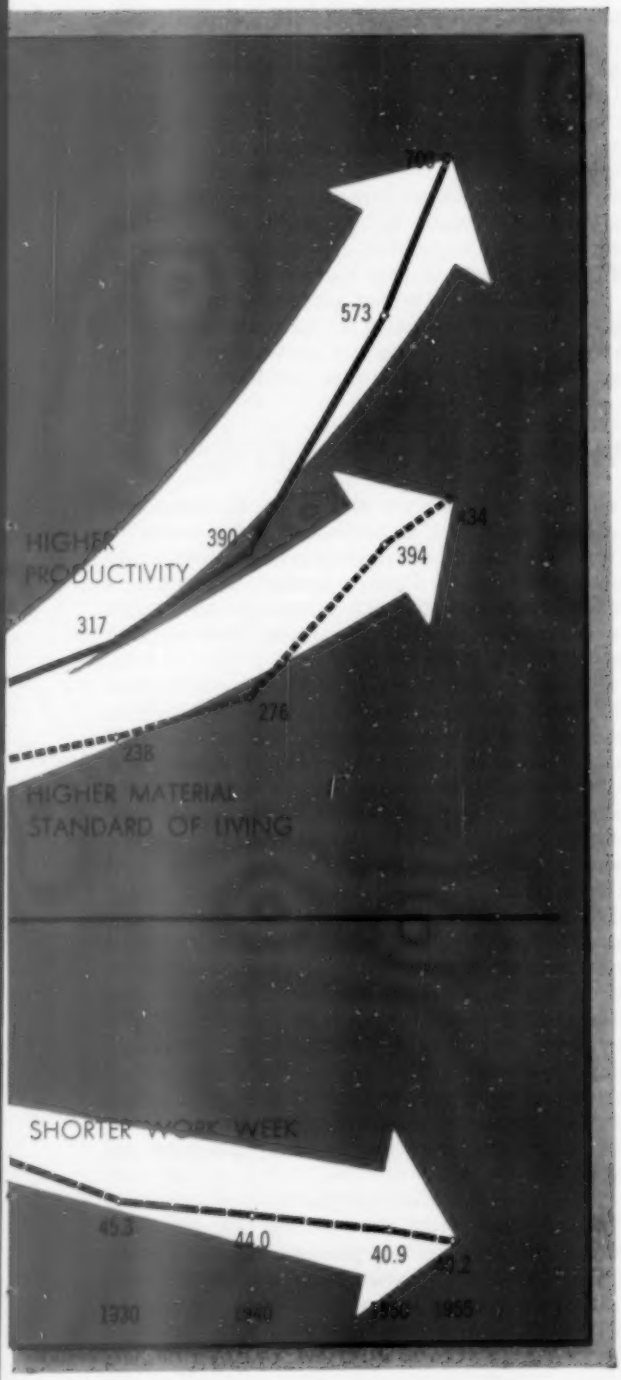
But of this we are sure: For the plant operating man, the real problem will be to find the time to get his job done in the midst of all the leisure he can't take advantage of.

THE


THE GREAT DILEMMA:
More buying power? Or more leisure?
As productivity continues to rise, we can choose between a higher material standard of living and a shorter work week.
INDEX NUMBERS (1850=100)
HOURS OF WORK PER WEEK
100
120
114
126
115
132
126
173
207
229
221
276
69.8
68.0
64.0
61.9
60.2
55.1
When productivity rises — as it has been doing for 100 years — labor can take its gains either in a higher material standard of living or in shorter hours. Or in some of each, as we do in the pattern of the past: in 100 years productivity per man-hour has increased six-fold, standard of living per capita, four-fold — not quite so fast, because the work week has shrunk 47%.
Sources and definitions: See note on page 342
1850
1870
1890
1910

By CARROLL W. BOYCE, Associate Editor, FACTORY

4-DAY WEEK?



WE'RE ALREADY headed toward a 32-hour week. The chart at left shows facts in the trend.

But when and how we get to the *4-day* week (which is not necessarily the same thing) are among the most complex questions facing labor and business leaders—and the nation—today, and for a long time to come. Letters and telegrams from such leaders (beginning on p. 91) indicate that the problem is already receiving thoughtful and temperate consideration.

POLITICS IN 1956

An almost chance remark by Vice President Nixon injected the 4-day week into the 1956 Presidential campaign. UAW-CIO President Walter Reuther leaped up to ask for a pledge to amend the Fair Labor Standards Act to make the 4-day week "national policy."

DEMAND IN 1958

As long ago as 1954 UAW-CIO was on record that "after the guaranteed annual wage has been secured, the shorter work week will take its place at the top of our . . . collective-bargaining agenda." In his reply to Nixon, Reuther stated: "UAW proposes to take the first collective-bargaining . . . steps toward achievement of the 4-day work week in 1958, when present contracts with major corporations expire."

REALITY IN 19??

The 4-day week can come any one of three ways:

1. By freely arrived-at collective-bargaining agreements so geared to rising productivity that we can shorten hours while the standard of living keeps on rising (though more slowly than without the cut in hours).

2. By legislation. This way, we'll risk the inflation that overtime or a shortage of goods in the marketplace would create.

3. As a result of a nationwide economic collapse and depression. That's the way the 5-day week came. Another depression might bring another spate of "share-the-work" (really share-the-poverty) plans.

This third way would help nobody and hurt everybody. The second might help some people—but would surely hurt many. Besides, it carries the grave risk that rampant inflation can easily become great depression.

Thus, slow but determined progress—the first way—is the only sure as well as safe road.

And it's now, not in the heat of collective bargaining, that we must examine the problems of a 4-day week and its alternatives.

Turn the page

Begins on page 84

4-DAY WEEK—WHEN

WHAT IS A 4-DAY WEEK? So far, most of the talk has been in generalities.

According to Walter Reuther, it seems to be something for which the worker should receive five day's pay. Reuther seems willing for his people to work five days —as long as they get five days' pay for the first four days, and then some extra for the fifth.

But the popular concept—the idea that comes to the mind of the average person when he hears the term—is a schedule that gets all his work into 4 calendar days, and gives him a 3-day weekend.

Short-term outlook—Even if we didn't have to worry about the added labor costs and resulting inflation (which we do have to worry about—plenty) an overnight shift to a real 4-day, 32-hour working schedule isn't feasible right now for one very simple reason: **There just aren't enough workers available today to turn out all the goods and services in 32 hours that we, as a nation, demand.** With over 95% of our labor force employed (67-million job holders, less than 3-million jobless) an average of nearly 40 hours a week, our Gross National Product (total output of goods and services) is barely able to keep pace with our Gross National Appetite (total demand for goods and services).

An immediate cut of 20% in hours of work would also mean a cut of 20% (or very nearly that) in output of goods and services. Result: shortages of everything, requiring severe rationing almost overnight. To cite just a single example of the dislocation that would result: We'd need millions more workers just to grow, pack, and distribute the food necessary to prevent mass starvation. Those workers would have to be recruited and perhaps even drafted from other industries that were already plagued by inability to meet demand on their own 4-day week.

In that light, talk about working four 8-hour days "in the near future" is little short of idiotic.

The long view—As a long-term goal, achieved through gradual reduction of working hours, the 4-day week is attainable. The practical question for the worker with that 3-day weekend glint in his eye is, "How long is long-term?" Up to a point, it is possible to answer his question.

If—and it's a whacking big *if*—we were willing to forego all increases in our material standard of living, we could do it in less than 10 years. (At the present rate of increase in output per man-hour, 10 years hence we could produce the same goods and services on a 32-hour week as we now produce on a 40-hour week.) But this, again, is verging on the idiotic. Barring a great depression that might *force* a halt in the rise of material living standards, it's a sure bet Americans would not be willing to stand still for 10 years.

There is, of course, one way we can have our cake and eat it, too. That's to make output per man-hour rise faster than heretofore. If the rate rise could be doubled, we could keep on increasing our material standard of living (as in the recent past) *and* have a 4-day week at the end of 10 years. That may sound simple—but it won't be. Doubling the rate of increase in output per man-hour is a monumental task. If we can double it by the *end* of 10 years we'll be doing very well. Why? Because, in spite of some sharp year-to-year changes, the long-term rate has varied little over the entire 100 years for which any decent yardstick is available.

So, for the 4-day-week goal, we can say "long-term" means at least 10 years. More probably it means from 20 to 30 years. Automation can increase the rate of productivity growth, help to shorten the "long-term." But it's foolish to assume that automation will perform "miracles" of both production and economics.

Above all else, though, we can say with certainty that we must come to the 4-day week gradually.

BARGAINING REALITIES

In view of the facts above you might ask, "How come Reuther is yelling for an immediate 4-day week?"

The answer: Reuther is a realist. If it sounds contradictory to say he's a realist because he's serving a completely unrealistic demand, just consider these practical "facts of life" that he (or any other trade unionist) faces in a bargaining situation:

. . . *A union hardly ever gets all it asks for* at the bargaining table. So the realistic thing to do is to ask for more than you expect to get—at least the first time around. Remember the initial pension demand? It was $100 a month for all workers over 65. The initial settlements? A supplement to Social Security to bring the total up to $100 a month for workers with 20 (and sometimes 30) or more years of service.

The demand for the Guaranteed Annual Wage worked the same way. The unions asked for a guarantee of full pay for a year or more. They settled for a formula that supplements unemployment compensation up to 60% of base pay for six months or less.

There's little reason to believe the demands for a 4-day week will follow a different course. What the unions are seeking as an *initial* goal is recognition *in principle* that the 5-day, 40-hour week is not a permanent fixture in our industrial economy. To be sure of getting that much, they ask for everything they can think of.

. . . *The unions need an issue* that's easily understood and highly popular with the rank and file. A 4-day week conjures up all sorts of pleasant daydreams in the worker's mind (and maybe in the executive's, too). It's not an abstraction. It's concrete. It's something the worker—and his wife—can get exicted about. It would be pretty hard to work up strike fever over "establishing

and HOW?

the principle of a gradual reduction of working hours." But the union hopes, at least, that an issue with the drama of a 4-day week will generate enough enthusiasm to support a strike if it becomes necessary.

COST REALITIES

No matter how we arrive at a 4-day week or how long it takes us to get there (unless through a violent depression, as was true of the 5-day week), you can paste this statement in your hat as a certainty:

Every reduction in working hours will be accompanied by an increase in total weekly pay.

In other words, at no time will any union willingly negotiate a decrease in working hours unless it gets at the same time an increase in hourly rates that more than offsets the cut in hours. Why? Because to the extent that the union is an honest agent and representative of its members, union leaders know that the best and most direct evidence of its value is the added dollars it puts in the workers' pay envelope at the end of the week. Of course, there may come times when a union has no choice but to accept shorter hours because of depressed conditions—local or industry-wide. It's happened in segments of the textile and rubber industries in recent years. But that's a matter of management scheduling—hardly a reduction in the "standard" work week.

Wage costs—The "fallacy" of paying more dollars for fewer hours of work is obvious: Unless you can increase output per hour enough to maintain a balance between total pay and total output, you've got inflation pure and simple. But (and this is easy to overlook in the sea of emotionalism likely to surround bargaining for a 4-day week) it's not necessarily any more inflationary than simply paying higher wages for the same old 40 hours per week.

Notice, though, the important qualifier: Not *necessarily* more inflationary. Because if the reduction in hours results in production insufficient to meet demand, excessive competition among buyers in the marketplace will produce inflation.

Equipment costs—Here's another element of cost increase that comes into the picture when you reduce the number of hours per week: You're using equipment fewer hours per week. So capital-equipment cost per hour and per unit of production goes up. By the time you get to a 32-hour week (compared with 40) your plant-and-equipment unit cost will be up 20%. In these days of increasingly complex and expensive equipment this might be fully as important as the increase in direct-labor cost.

Because of the impact of machine utilization on production costs, the possibility of any substantial reduction in the work week automatically requires consideration of alternatives. For example, using equipment on two shifts instead of one—or any other scheduling variant that will make more effective use of plant and equipment (see page 89).

"Weekend" costs—There's one more way a 4-day week would boost costs: Some operations must go on seven days a week. And certain types of maintenance work can be done reasonably only as weekend jobs. Already an increasing number of labor contracts require payment of time-and-a-half for Saturday "as such" and double time for Sunday "as such," even though work on those days is regularly scheduled and falls within the non-overtime number of scheduled hours. With a 4-day week, Friday (or Monday) might call for premium pay, with still further increase in the premium for Saturday and Sunday "as such." As any employer who faces such premiums on a large scale for Saturday and Sunday can testify, there's no faster way to skyrocket labor costs.

FOUR LONGER DAYS?

If labor's target is a 4-day week *per se*, one way of getting it is to work more hours each day. But there are some problems:

Efficiency—A 4-day week with 10 hours per day might not produce the same amount of work. World War II studies indicate that worker efficiency begins to drop off as length of the work week is extended. Undoubtedly much of this drop is due to the sixth or seventh work day. But some of it may be due to the longer hours in a day. The extent to which longer hours per day would cut into efficiency when the worker knows he is to work only four days is an open question.

The law—There are some legal barriers to fewer but longer working days. The Walsh-Healy and Bacon-Davis Acts (covering employees working on government contracts) require overtime payment for more than eight hours in a single day, regardless of whether the week's total might be less than 40. And some states have similar laws applying to certain types of work.

Such laws actually work two ways to block a 4-day week that's based on more than eight hours a day:

. . . Overtime premium would raise the employer's cost per unit of production.

. . . The premium-pay requirement is not uniform for all. Thus the employer on a 4-day week would face higher costs than his 5-day-a-week competitor.

Workers' wishes—Is the worker so eager for a 4-day week that he'll work more than eight hours a day to get it? The answer may well be, "No."

In several industries (leather, brewing, pottery, clothing, and certain textiles, for example) a work week of 36 hours or less has been commonplace for a number of years. In some cases this has been the result of depressed conditions in the industry. In others it's been a specifically negotiated schedule. The needle trades, for instance (represented by the ILGWU), now has more than 95% of its membership covered by contracts for a 5-day, 35-hour week.

Yet there has been no demand in any of these industries for a shift to equivalent hours on a 4-day week.

Now, to see how we may move toward a 4-day week, turn the page

Begins on page 84

MOVING TOWARD THE 4-DAY WEEK

It took several thousand years to make the transition from the Biblical "6 days of work and one of rest" to our present 5-day week. Now, less than 25 years after the advent of 5 days as the standard, we are talking seriously about a 4-day work week.

How did we make the change to the 5-day week? And will we repeat the pattern in getting the 4-day week?

The great depression—The 5-day week was an "invention" of management in the early days of the great depression of the 1930's. At a time when prices were dropping and production schedules had to be cut, a reduction to a 5-day week without a cut in hourly wages seemed (to many) like a fairly painless way out of a difficult situation. As time went on and economic conditions worsened, hours of work dropped still lower—to an average of 34.6 in 1934.

Then the law—Almost at the bottom of the depression Congress stepped into the picture and passed the Fair Labor Standards Act, often known as the Wage-Hour Law. This required payment of time-and-a-half for any time over 40 hours in a given week. The purpose of the overtime provisions of FLSA was two-fold:

. . . *To spread the work* by penalizing employers who experienced a degree of economic recovery. In effect, the law forced them to hire more workers instead of extending work schedules for present employees to more than 40 hours.

. . . *To protect employers* who took on the added overhead and administrative cost of more employees against the "unfair" competition of employers who worked a smaller force a greater number of hours.

On the heels of federal wage-hour legislation came many state laws to the same effect—covering intra- as well as inter-state commerce. And not long afterward came the Walsh-Healy and Bacon-Davis Acts.

LEGISLATION?—OR BARGAINING?

Today, talk about a 4-day week is not limited to the possibilities of hammering out agreements for shorter hours at the bargaining table. We hear it voiced in the context of "national policy," suggesting that it's something that can be legislated into existence—perhaps overnight.

That kind of talk can have only one result: Employers all over the nation would be so fearful—rightly—of the economic consequences of such a move that they would blindly and stubbornly oppose—wrongly—any and every move toward shortening hours, however moderate they might be.

Now it's quite true that economic penalties—whether imposed by legislation or exacted at the bargaining table—can force employers to improve methods, install new machines, adopt new managerial techniques, and take other measures to reduce costs. Wage increases have exactly this effect. And as long as the pressure for improvement stays in balance with the capability for improvement, the whole process is beneficial. From 1953 through early 1956, for example, hourly wages rose more than 10% while the consumers' price index barely budged.

FLSA, of course, could be amended so as to produce continuous pressure for a gradual reduction of working hours. Just as the Social Security tax is increased ½% or ¼% at a time over a long period (21 years so far to go from 1% of $3000 to 2¼% of $4200), FLSA could reduce the overtime penalty level by one hour every few years. In theory this could be continued without undue economic strain right down to the point where we would finally have a statutory 4-day week.

As a practical matter, however, legal pressure would create an almost impossible situation below the level of 36 hours (4½ days) unless the "overtime beyond eight hours" feature were removed from other legislation. Surely, workers would offer vigorous resistance to a schedule that required them to work only 2 or 3 hours on Friday morning. (Though the 4-hour minimum call-in pay provision in many labor contracts was not written to cover this kind of situation, the unions would demand that it be applied.)

Thus there are two areas where changes in the laws we now have could help in reaching the ultimate goal of a 4-day, 32-hour week:

. . . *Exerting gradually increasing pressure* to reduce the work week through application of overtime penalties at successively lower levels.

. . . *Eliminating the barriers* to the transition from the 5-day to 4-day week that now penalize employers for workdays in excess of 8 hours.

Of course, complete repeal of all statutory overtime beyond 8 hours in a single day might not be desirable.

As an alternative, one possibility is some sort of compensating formula, such as allowing up to 9½ hours in a single day provided the employee is paid time and a half for *any* work on a fifth day in a week. Gradual reduction in the single-day maximum to 9, then 8½, and finally 8 hours would keep up a steady pressure for reduction of the work week without penalizing the employer during the transition from a 5- to 4-day week.

Difficulty in bargaining. The real hooker in making a gradual reduction in working hours (even under "favorable" legislation) would come in bargaining.

To cut one hour off the 40-hour schedule on a 5-day week would be taking only 12 minutes off the daily schedule. Yet one hour in 40 is the equivalent of a 2½% wage hike—say a nickel an hour on the basis of a $2 an hour wage, not far from today's average in manufacturing.

The prospect of haggling with the union negotiators over taking 5¢ of an 8¢ raise (roughly the 1955 average) in the form of a reduction of 12 minutes per day would be good for a laugh if it didn't present such a serious threat of inflation. Obviously, the union is going to want both when you're dealing with anything as "inconsequential" as 12 minutes a day.

The situation will be somewhat easier to handle when you're dealing in terms of 3- or 5-year contracts. At least the long-term gives you some elbow room in which to negotiate.

SCHEDULING THE 4-DAY WEEK

When and if the 4-day week becomes an accepted thing, will it mean everybody works Monday through Thursday? It can't. Not any more than a 5-day week means everybody works only Monday through Friday.

Most manufacturing and many commercial firms can schedule the greater majority of their employees for standard hours on consecutive days. But this very bunching of hours requires that millions of others—especially in the retail trade and service industries—work at different hours.

Trouble with five days—Even the 5-day week is bad enough for some organizations. Lots of stores work a 10-to-6 day, plus one or two evenings and all day Saturday. City banks are staying open an evening or two, and suburban banks are finding they must open at 7:30 or 8 in the morning. Local transportation is choked five mornings and five evenings but mostly idle the rest of the time, meaning split schedules for transportation workers. Inter-city transportation is jammed beyond the endurance of the public on Friday and Sunday evenings. And highways, restaurants, motels, resorts, and recreational facilities of all types are taxed to capacity—and then some—for the 60 hours from Friday evening to Monday morning. Then, except for prime resort areas at the peak of their season, all these facilities are practically deserted until the next brief weekend.

More trouble with four days—The 4-day week, on the basis of standard hours on four consecutive days, would do nothing at all to ease the local situation—shopping, service, transportation, etc. And there's a good chance it would worsen the weekend situation.

HOW YOU CAN SCHEDULE A 4-DAY WEEK

	"REGULAR" (6 days per week)				"CONTINUOUS" (7 days per week)	
	Three equal crews				Two equal crews	
Day of week	At work			Off	At work	Off
Sunday				A B C	D	E
Monday	A		C	B	D	E
Tuesday	A		C	B	D	E
Wednesday	A	B		C	D	E
Thursday	A	B		C	E	D
Friday		B	C	A	E	D
Saturday		B	C	A	E	D
Sunday				A B C	E	D
Monday	A	B		C	D	E
Tuesday	A	B		C	D	E
Wednesday		B	C	A	D	E
Thursday		B	C	A	E	D
Friday	A		C	B	E	D
Saturday	A		C	B	E	D
Sunday				A B C	Repeat schedule as in previous two weeks.	
Monday		B	C	A		
Tuesday		B	C	A		
Wednesday	A		C	B	*Assumption of double-time pay for work on Sunday "as such" means average of four days pay each week on this schedule.	
Thursday	A		C	B		
Friday	A	B		C		
Saturday	A	B		C		
Repeat schedule as in previous three weeks.						

SCHEDULING TO EASE TROUBLES

The 4-day week will give us a chance to solve many of the problems associated with standardized work schedules.

Perhaps it will lead to staggering weekends over five days—with work scheduled Monday through Thursday, Tuesday through Friday, and Wednesday through Saturday. But with only Wednesday and Thursday as common work days for all companies, your company would find it hard to do business with a company that's closed two of the four days yours is open.

A possible way to achieve complete staggering—and keep plant equipment busy six instead of five days a week—would be to split the work force into three groups. With two of the three groups working any given day (see table at left) you'd have a full work force six days of the week. The schedule (other combinations are possible, too) could bring all the following advantages:

. . . *Employees would have two 3-day weekends* in each 3-week period, plus one 2-day break and a single day off.

. . . *Employees would have two days off each week* while shops, services, and businesses would be operating. This would reduce the time-off employees feel they need for essential personal business.

. . . *Long weekends would be distributed* over a 5-day period—but for only two-thirds of the work force in any given weekend. The other third would be off on Wednesday and Thursday. With fuller use of resort and recreational facilities, costs and probably prices could come down. Besides, peak loads on highways and common carriers would be spread out.

. . . *Any 5-day business could increase utilization* of its equipment (machines, trucks, buildings, etc.) by 20%—from five days to six. This would mean buying and installing 20% less of new facilities to get new capacity.

Problems still—Such staggered scheduling would still leave some problems that, until solved, would be disadvantages:

. . . *At least two people* would have to be fully trained to do every job during operating periods. And to "cover" during vacations or illnesses would mean three. For many management and supervisory positions, this would be tough. One thing for sure: You'd need better record-keeping and control procedures to permit two or more people to do the same management job on different days of the week.

. . . *Only one day would be open for shutdown maintenance* of machines and equipment. That would be

Sunday. With high premium rates for Sunday work, weekend maintenance would become more costly than ever. What's more, a single day's shutdown isn't enough for many types of maintenance.

To be sure, some companies are already working a 7-day schedule. Their operations or processes require it. For them, scheduling is already tough. The 4-day week wouldn't make it any harder—but it wouldn't make it any easier either. With one exception: In companies where double time for Sunday "as such" is in 7-day-per-week contracts. For them, alternate crews could simply be scheduled four days on and four off, followed by three on and three off. With double pay for working every other Sunday the worker would get four days' pay for his 3-day week—in effect, the same as a man on a 4-day weekday schedule—and getting his Sunday bonus in the form of an extra day off.

FIVE 4-DAY WEEK HEADACHES

1. TWO JOBS

Low efficiency of workers who hold two jobs is a problem even on a 5-day week. On a 4-day week, it'll be much worse:

. . . **Shortage of skilled craftsmen, toolmakers,** etc. will be aggravated with each employee working fewer hours, so there'll be higher wage bidding, more willingness by employers to hire "second job" workers.

. . . **Physical strain on the worker** wouldn't be so great, hence many who today stay out of "second job" market might be tempted to try two 32-hour jobs.

Crux of the matter, on either a 4- or 5-day week, is whether general economic conditions and the worker's pay scale would put pressure on him to carry a second job for the added income, or allow him to enjoy the added leisure of a 4-day week with a single job.

2. BIG PUSH IN MID-SIXTIES

A temporary situation, starting in 1963 and continuing about five years, will add fuel to the drive for a 4-day week:

. . . **Reflecting the high birthrate** of the years right after World War II, the number of people becoming 18 each year (average entry into work force) will skyrocket. It's now 2.1-million a year. By 1963, it will be 2.6 million. But by 1965, it will jump to 3.6-million.

. . . **Reflecting the low birthrate** of the 30's and early 40's, the rate of family formation (already dropping sharply from the early 50's) will stay low 'way into the 60's. This will reduce the number of births in the early and mid-60's—give the impression that population growth rate has slowed.

Putting those two facts together, some people will shout that we need a reduced work week to spread the job of providing for a less rapidly growing population among a more rapidly expanding labor force.

But by 1970, the post-war babies will be forming families of their own, send the number of births soaring. By the mid-70's, the picture will be completely reversed again: slow growth in labor force, rapid rise in total population. (See "What Automation Means to America," FACTORY, September 1955.)

3. HIGH COST OF LEISURE

Some people may discover that more leisure is a bane, not a blessing. Why? Because they don't spend much money while they're working, but they spend plenty in their leisure hours.

The 4-day week would mean a 50% increase in weekend time. That's half again as many days to swim or ski, go to movies or the ball park, fish or play golf, drive greater distances to the shore or the country. In effect, every weekend would be a Labor Day weekend.

All these leisure activities cost money. Workers would probably want any shift to a 4-day week to be dressed up with a real wage increase equal to at least 50% of the family budget for recreation.

4. FOUR DAYS OR LONGER VACATIONS?

Many thoughtful people suggest that workers would prefer longer vacations to a 4-day week. In other words, fewer hours of work, but all the extra leisure in a single "vacation" package. Could be.

But the fact is that some workers now find they "can't afford a 3-week vacation." Their money runs out and they spend their third week at home letting the kids and neighbors get in their hair.

And the long vacation poses a problem for business probably even tougher than scheduling a 4-day week. Ask any shop with 3- or 4-week vacations. It's murder to keep operations going without being arbitrary about scheduling workers' vacations. For sure, not all workers can take their vacations in summer months without the shop falling apart.

We might even move in the opposite direction. Part of the shorter work week could be offset by shorter vacations and fewer holidays. Though nobody would suggest going so far, it's a fact that elimination of the 4-week vacation and 4-week paid sick leave plus holidays now available to federal employees would almost exactly offset a shift from a 40- to a 32-hour week.

5. SCHOOL AND THE KIDS

Teachers, naturally, will want—and be entitled to—a 4-day week if it becomes general.

In addition, Pop won't get the full stretch of his 3-day weekend if the kids have to stay in school on his extra day off.

Yet these pressures on the schools will run counter to the need for more time in school—time to learn more about living and working in an increasingly complex world. But until the "Learn while you sleep" machines are perfected, it will be hard to cut the hours that are needed for schoolwork.

How Key Men View the 4-Day Week

"Has always been a major goal of labor"

GEORGE MEANY
President, AFL-CIO

Shorter hours of work have always been a major goal of organized labor. It has been the labor unions of America who have led the way for the successive reductions in the work day from 12 to 10 to 8 hours, and for the reduction in the work week from 6 to 5½ and then to 5 days.

Today, there is renewed interest in the question of shorter hours of work. On Sept. 11, the AFL-CIO held a Conference on Shorter Hours of Work. While the Conference issued no statement and did not set any union policies, it was the consensus of the group that this issue will occupy greater attention in coming years for collective bargaining.

The 40-hour, 5-day week has now become standard throughout much of American industry. Even before the passage of the Fair Labor Standards Act in 1938, unions in many industries had substantially achieved the 40-hour week. Since that time unions in such industries as services, transportation, and trade whose members are not covered by the FLSA, have on their own largely achieved the 40-hour standard.

Along with this reduction in standard weekly hours has come, at labor's insistence, a more widespread adoption of longer vacations together with an increasing number of paid holidays. These too have had the effect of reducing the average hours worked by the individual worker.

Looking into the future, it is clear that labor will continue to place heavy emphasis on obtaining shorter hours of work. In the past, the American economy has proved productive enough so that in response to labor's demands, workers were able to obtain both a gradual reduction in hours worked and a continuing increase in income received. In view of the present accelerated pace of all types of technological progress, this trend will undoubtedly continue in the future.

The fact is that a number of unions today have already achieved standard work weeks shorter than 40 hours. This is true, for example, in the ladies' garment industry and in the printing trades. To a lesser extent, it is true for a variety of other industries with the result that a 1955-56 survey by the Bureau of Labor Statistics indicated that 17% of all workers in 17 major labor market areas are working on schedules of fewer than 40 hours.

What form will the future reductions in hours take? In the headlines of the past few weeks there has been considerable discussion of a 4-day week. Certainly this is an appealing possibility. Most of the experience to date, however, has been in terms of a reduction to 7 or 7½ of the hours worked per day, retaining the 5-day week.

Another very real possibility is a continuation of the trend towards longer vacations. Instead of 2- to 3-week vacations, the time may come when the range of vacation periods will be from 4 to 6 weeks.

There is no need for uniformity among either labor or management in approaching the problem of shorter working hours. The specific method selected, by reducing the hours worked each day, by cutting the days worked per week, through longer vacations or more holidays with pay, or a combination of these, can be chosen to fit the needs of workers and the requirements of industry. Through collective bargaining, workers and management will develop a pattern to fit the particular situation involving their bargaining unit.

"Must not come prematurely"

P. V. MOULDER
President, International Harvester Co.

The 4-day work week for a majority of the employees of American industry and business is not beyond the accomplishment of the people of a united progressive nation. It can only come, however, in a manner that will advance rather than retard our progress when and if the nation's work can be done in four days instead of five. That means our productivity must advance to the point where we can not only care for present needs but for future ones with a 4-day week. It means we must have the capital, the plants, and the tools to turn out that production. It means that our standard of living must advance to the point where we can afford an extra day of leisure.

It means that a 4-day week must not come prematurely as the result of pressures from any organized group of our population. It means that it must not place in motion new forces of inflation that will result in less production and higher prices. It means it must not interfere with our continuing advance toward a higher standard of living. In brief, the 4-day work week must be the reward of things achieved rather than an empty expression of things hoped for.

"More abundance or more leisure"

COLA G. PARKER
President, National Association of Manufacturers

Your magazine is performing a valuable service in bringing this question down out of the realm of emotionalism in which it is threatening to become involved.

The facts are these: Any individual has at all times a choice between more abundance and more leisure. The longer anyone works, the more goods and services he can enjoy. The same is true of the American people as a whole. We have available for consumption as a nation only what we produce as a nation.

Regardless of the progress of technology, automation, and other scientific advances, it always will be true that the more hours or days we work in the aggregate, the more we will have. This cannot be changed by legislation, government edict, collective bargaining, or any other arbitrary method.

If we properly make use of our talents in invention, production methods, etc., it is inevitable that over a period of years average hours

of work will tend to drop, just as individual weekly hours have dropped in 175 years from 70 or more per week to about 40. The latter point was arrived at by improving our methods, processes, and machinery, thus enabling the individual worker to produce more with the same or less effort in the same span of time—not through a minimum wage law, a so-called Fair Labor Standards Act, a Bacon-Davis Act, or any other legislation.

Even if legislation were to be passed designating four days as the normal work week, the boundless wants of the American people would keep the actual number of hours worked to the level required by demand in any industry relative to its productive capacity and the size of the available work force. The difference would be that overtime payments would start sooner, and this perhaps is organized labor's real goal. The result, too, would be enormously increased cost of production at the expense of all the people, at a time when we need most of all to reduce such costs so as to make our increased abundance available to everyone.

One of our problems as we make technological progress is to adjust the hours worked to supply and demand so that no inflationary influences are let loose in the economy and no segment of consumers or workers is required to suffer inequities. This can be done best by the play of free market forces. To submit this matter to legislative or political determination is to invite maladjustments in the economy which could lead to disaster.

"Nothing sacred about a 40-hour work week"

CYRUS S. CHING
President, Ching Associates

I feel that there is nothing sacred about a 40-hour work week, or a work week of any other specified number of hours or days. We can shorten the hours per day or the days per week in direct ratio to the extent that we can apply scientific, engineering, management, and labor skills to the job of producing sufficient goods of a quality to meet the demands of the consuming public at prices they can pay.

I firmly believe that the 4-day work week cannot be established and made to operate by law until we have demonstrated that we can maintain and improve our present standard of living on that basis.

"No possibility in foreseeable future"

J. K. LOUDEN
Vice President, York Corp.

In view of our increasing population and continuing desire to improve our own standards of living, plus the pent-up demand for goods all over the world that are needed to raise the standards of living of all peoples, I believe we are faced with the problem of ability to produce, and produce competitively with other industrial nations, that will not only tax our manpower but our engineering and production skills as well. Therefore, I see no possibility of a 4-day week in the foreseeable future if we are to maintain our position of industrial leadership.

"Will need to go to automation"

HOWARD P. EMERSON
President, AIIE

In my opinion, present high living standards can be maintained in spite of the demands of a growing population by drawing in the same proportion of people from the total population to work in industry as are now used. Simply let the same per cent of the new population, as it grows up, go into industry and make the cars and television sets for the rest, using present methods of production, present types of equipment, and present working hours.

If it is desired to increase production or cut the work week to four days, something new must be added. Methods and equipment must be improved in some dramatic way. We will need to go to *automation*.

But automation will require a great deal of preliminary planning and estimating by engineers; design of new types of equipment by engineers; and development of controls, again by engineers. Even under present conditions we have a shortage of engineers. To get a 4-day week generally will require a 7-day week for engineers—unless more engineers are found. The shortage of engineers needs to be licked before we can realistically plan for a 4-day week. We must induce more qualified students to go into engineering. If successful in this, we will still face another shortage, that of adequately trained teachers of engineering and technical subjects. We might overcome these shortages and make a shorter work week possible, but not before one or more new generations of engineering graduates have become available.

"Can technology meet demands?"

WILIAM G. CAPLES
Vice President, Inland Steel Co.

All of the population growth figures we have studied indicate that given a constant rate of increase in national product and the resultant rise in the standard of living, that we will still be short 2-million people in 1975 even if the work week continues as it is.

It seems to me that the real fear should be whether our technology can keep pace with the demands on it—not whether the work week will be shorter.

"Not feasible for many years to come"

PAUL L. DAVIES
Chairman, Food Machinery & Chemical Corp.

I do not believe the 4-day week will be feasible for many years to come unless we should have a real depression, which I do not believe is foreseeable at this time if there is cooperation between labor, government, and management.

Most economists predict a large increase in consumer demand and our gross national product over the

next 10 years, with possible limitations being only the supply of skilled labor and the capital to take care of our expanded facilities. I do not believe a reduction in the work week would be possible without limiting our opportunities for the continued growth in our economy.

Labor cost increases have already far outstripped productivity increases, and I am sure under present conditions and for the foreseeable future the adoption of a 4-day week would only be another forward step in increasing the tempo of inflation —which in turn would lead to a downturn in our economy.

"Picture is neither clear nor simple"

A. J. HAYES
International President, International Assn. of Machinists

Fundamentally, reduced working hours at the same or higher weekly pay are essential to the increased consumer purchasing power and leisure time which promote the full utilization of the increased production of goods and services in an expanding economy.

This factor, combined with the tremendously increased productivity which is promised by recent technological developments, will inevitably lead to a reduction in the present work week. How much, how soon, and in what form, are difficult questions to answer. The "4-Day Week," after all, is a political catchword, coined in an election year.

When the 32-hour week will come, the rate at which it will be achieved, and the form it will take, all depend upon circumstances and considerations which vary from industry to industry and from one section of the country to another.

Major factors for a reduced work week in the near future are the productivity increases which will result from the application of automation and atomic energy, and the mounting level of full and part-time unemployment of the past few years. With true unemployment now standing at a fraction in excess of 6% of the labor force, drives to "spread the work" can become an increasingly important factor.

A serious impediment to immediate attainment of a shorter work week lies in the shrinking labor force which population experts foresee as a result of the low birth rates of the 1930's. The prospect of an increasing population with mounting demands for goods and services, combined with continuing demands of an adequate defense machine, served by a proportionately smaller number of persons in the employable age brackets, raises a number of problems, including that of the shorter work week.

The picture is neither clear nor simple. Basically, I think, we can expect to see most, and most successful, pressure for reduced hours of work in those industries and in those sections of the country where unemployment is severe and especially in such industries as the automobile industry where automation is established and profitable.

Pressure for a reduced work week will be least, and least successful, in industries and occupations which are suffering from an under-supply of labor. There is nothing to be gained by a shorter work week in such situations. The sensible and desirable method of permitting employees in such industries and occupations to share in the fruits of mounting productivity would be through increased wages.

On the whole, I think, we shall witness a general trend in the direction of a shorter work week, with varying rates of progress in different industries, and with the predicted proportionately smaller labor force and the demands of national defense acting as deterrents upon the speed with which we would attain a markedly reduced work week under more normal circumstances.

"A dangerous step toward socialism"

WILLARD F. ROCKWELL, JR.
President, Rockwell Mfg. Co.

We feel very strongly that the 4-day week is something to be avoided as long as possible—not only for the immediate undermining effect on our economy, but also for the ultimate demoralizing effects on our individual and national character and strength.

Over-extended leisure, we firmly believe, dulls the "cutting edge" of a man's talents, intelligence and pride of accomplishment. Or—to put it more simply—too much leisure makes Jack a dull boy.

When a man's work ceases to be the central avenue along which his efforts and creative thought are directed—when a large majority of his time is not dedicated to it—something happens to the man and to the civilization of which he is a part.

A 4-day week, we believe, would represent a long and dangerous step along the road toward socialism and national paralysis. It would represent a full subscription to the theory that nearly half of a man's most productive hours—a people's most productive hours—can safely and soundly be dedicated to idleness and self-indulgence.

This, we believe, is a dangerous and destructive fallacy—particularly in a divided world, in which our deadly rivals are increasing their strength at a breakneck pace.

"Will probably take place gradually"

DAVE BECK
General President, International Brotherhood of Teamsters

The shorter work week, even the 4-day week, is a natural evolution in our American economy. Our present productivity rise of about 3% a year and our ever-expanding labor force indicate a terrific rise in the volume of goods and service to be produced by industry in the next few decades. Since workers have historically taken part of the rise in productivity in the form of more leisure time, this means that the shorter work week, possibly even a 4-day week, may be commonplace within the next two decades.

In the immediate years ahead, the 4-day week will probably take place gradually and selectively. Its "feasibility" will be based on the very same economic and social factors that produced the 5-day week—but with greater impetus due to collective bargaining.

It is important, however, to solve the purchasing power problem so that workers can buy the goods produced, whether they work a 4- or 5-day week. Even now, some workers on a 5-day week find it necessary

to work a 6- or 7-day week in order to make ends meet. Therefore, even though technology enables us to produce more goods, we must at the same time permit these goods to reach the hands of consumers by increasing purchasing power. Without maintenance of earnings, reduced hours become simply disemployment—a menace rather than a boon.

The worker's standard of living is based on two elements: first, the length of the work week—which is directly related to leisure; and second, his take-home pay—which determines his ability to buy goods and enjoy his leisure. How fast we go to a 4-day week may therefore boil down to the question of whether, *at a particular time*, workers want higher living standards in the form of more leisure time or in more material goods and services. More leisure time through a 4-day week will stimulate the demand for goods and services. This means no cut in pay, or even more pay, not only to buy the minimum necessities of life, but also for goods and services to enjoy in leisure time.

In any event, the 5-day week is not the ultimate, nor is the 8-hour day.

"Vote for 5-day week and more goods"

L. R. BOULWARE
Vice President, General Electric Co.

We, as the total work force, have the same choice we each have daily as individuals: *More work and more buying power—or less work and less buying power.*

In the absence of war, we *could* obviously sometime in the future reach a state of technological development which would enable us to achieve our 1956 level of living in only a 4-day work week. But we would doubtless, in the meantime, have gotten to like the then richer level of living accomplished in the 5-day week.

My guess is that the great majority of the work force—given a fair chance to choose—will for a long time vote for a 5-day work week and more goods, rather than a 4-day work week and the inescapably less goods. Even now, with the 5-day week, and the high pay, vast numbers of people prefer to earn still more by additional work on weekends.

"Will be a reality probably by 1962"

EUGENE J. BENGE
President, Benge Associates

Not if, but when, the 4-day week. Centuries of trend foreshadow the coming event. As man has learned to harness power to take over his drudgery, the length of his working week has ever shortened.

Nascent are the effects of atomic power, solar energy, jet propulsion, automation, digital computers. As their applications burgeon in our economy, the 4-day week will become a reality for millions of workers in automated industries, probably by 1962. Employees of small concerns, jobbing production, utilities, retail organizations, and service companies may not see the 4-day week for another 15 years.

New problems lie ahead: labor management relationships, occasional economic imbalance, constructive use of leisure time. These imponderables may become more difficult to solve than the mere acceleration of technology. By the same token, understanding leaders in all areas —labor, capital, political, social and spiritual—will be sorely needed. For it is they who must guide it, must "Write the vision and make it plain upon tables, that he may run that readeth it."

"Reduction itself is inevitable"

WILLIAM POLLOCK
General President,
Textile Workers Union of America

Man-hour productivity in the textile industry has increased more than 50% in the last nine years. This figure, coming as it does from an industry in which the impact of electronic automation has yet to be felt, suggests the dimensions of the problem our country will face in the future. We are already suffering in the textile industry from substantial unemployment and short-time work: a considerable proportion of the nation's depressed areas are textile areas.

It's obvious to us that, as productivity rises, the work week must shrink—but without loss of earnings. Our convention in May of this year adopted a resolution calling for a 35-hour week in textiles at 40 hours' pay. You can see that we were relatively conservative.

The current call for a shorter work week is in keeping with what happened in past years, during which, as we know, the standard hours were reduced from 54 to 48 to 40, with ever-higher productivity and earnings. Whether the next reduction should be to four days, to five 6-hour days or some variant of these, the reduction itself is inevitable if our national economy is to remain healthy.

"Within realm of future possibilities"

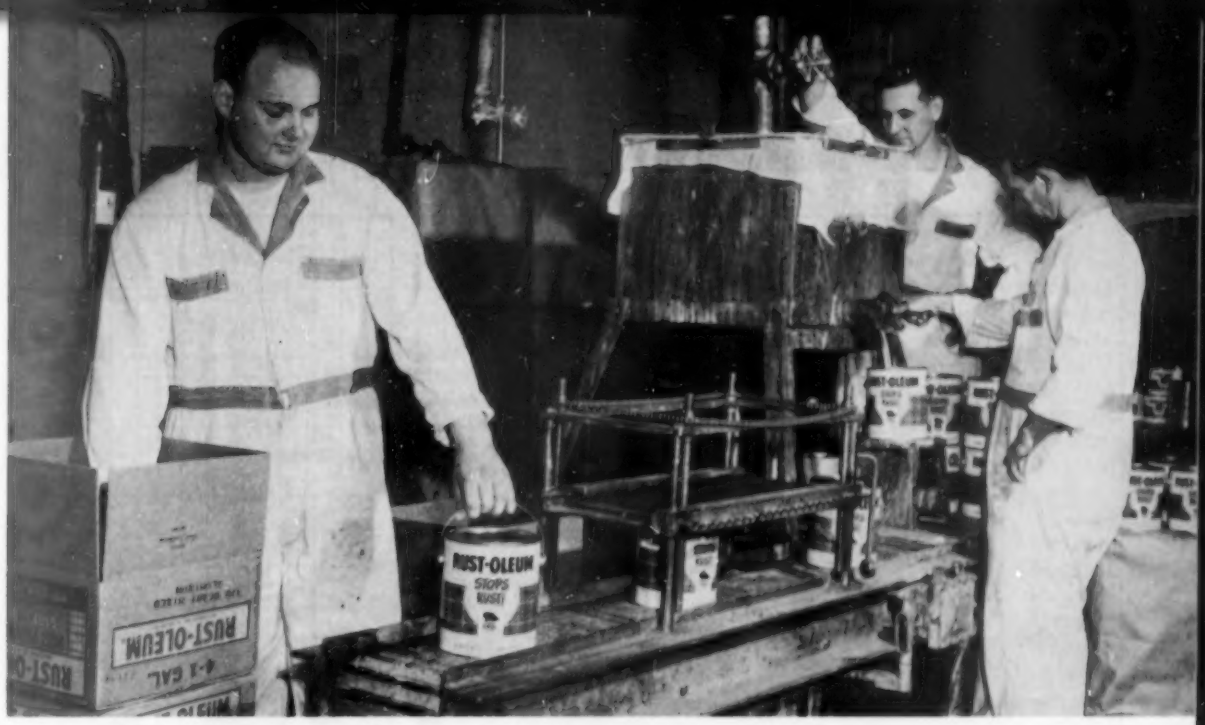
J. D. ZELLERBACH
President, Crown Zellerbach Corp.

So long as American productivity expands at current rate, I view the 4-day week as within the realm of future possibilities in American industry. I do not anticipate that any substantial reduction in working hours will occur all at once, but as result of gradual change.

During the past 35 years we have seen the average work week reduced from six days to five. This decline in working hours has been accompanied by continuing rise in productivity to the current economic heights of 1956. Future reductions in working hours will depend not only on productivity increases but also on certain choices before the American people. By that I mean the extent to which we choose to press for more leisure rather than for higher wages, job security, and other benefits.

Unforeseen developments could either accelerate or retard the trend toward the shorter work week. By

Turn to page 338



Flexible, portable rig makes this a...

Quick-Switch Filling Line

Canning small-lot liquids is no problem with this high-speed, portable system. It handles 15 paint colors, five can sizes—and seals the cans.

FLEXIBILITY and quick changeover. That's what the Rust-Oleum Corporation (Evanston, Ill.) needed for its paint-can filling system. And Rust-Oleum got what it wanted by hopping on the do-it-yourself bandwagon and putting together the set-up pictured above. Here are its chief advantages:

. . . *Flexibility* to fill five sizes of cans with one of 15 colors of paint.

. . . *Quick changeover* — takes only a few minutes.

. . . *Low initial cost* because set-up is simple and home-made.

The system consists of a cubical paint-filling box and a can-sealing conveyor mounted on casters. For a color change, three men move the conveyor under the proper vat outlet. At the same time, two other men wash down the 35-gal. box with a solvent. This reservoir, which rests on a movable angle-iron stand, is the only part of the system that requires cleaning.

In all, there are three conveyor-reservoir set-ups. One handles only 5-gal. cans. The other two units take care of cans from one gallon to one-half pint. Difference is that tops are crimped onto the 5-gal. cans and pressure-sealed on the other sizes. A five-man crew operates each line.

To change from one size of pressure-sealed can to another, workers make a simple screw adjustment. This raises or lowers a set of slightly pitched rollers that force tops on cans. If the change is from pressure-sealed can to crimp-sealed can, or *vice versa,* it's easy to substitute one type of conveyor arrangement for the other.

How the line works—With the set-up in place, the five-man crew goes into operation:

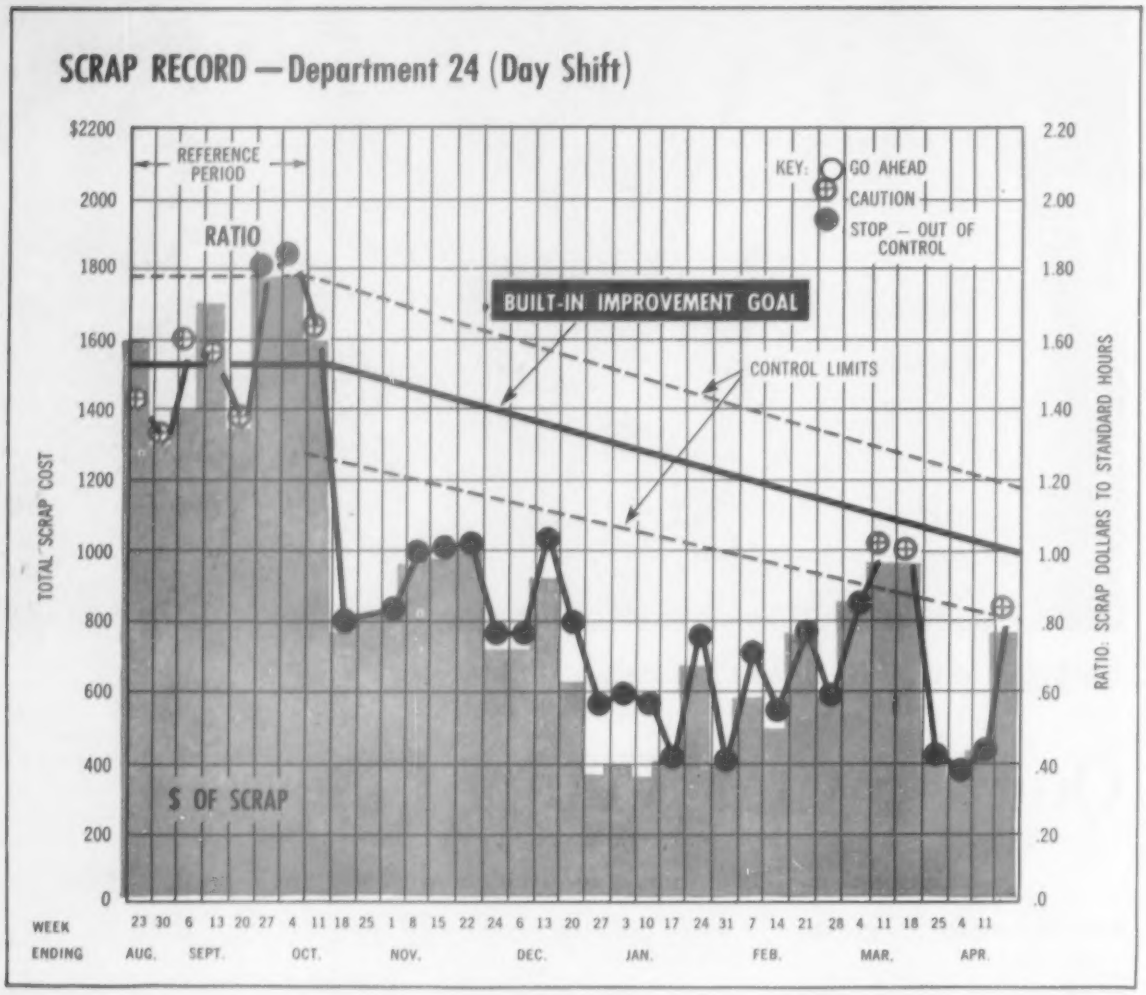
. . . *First man* operates the valve on the outlet from the vat (located on the floor above the filling room). It's his job to keep a sufficient amount of paint in the filling box. In addition to this, he watches for foreign matter and checks the color of the paint.

. . . *Second man* fills containers by working the gate valve at the base of the box. Next, he places the lid on the filled can and puts it on the motor-driven slat conveyor to his left. The tops are fastened down automatically.

. . . *Third man* removes sealed cans from the line. He packs the smaller cans in cartons, seals the cartons. On the crimp-sealed line, he stacks the 5-gal. cans.

. . . *Fourth and fifth men* take the filled cans or cartons away and bring empty cans to the filling area. (When smaller cans are processed, one of these two men also helps with the packing.)

The reason behind the system: Rust-Oleum produces to inventory. It fills distributors' orders as soon as they come in.



With controls that signal "Go," "Slow," and "Stop," . . .

New Slant for Scrap — DOWN!

These days it's cut scrap—or else. This built-in waste-cutter has already lopped 65% off scrap ratios for Jones & Lamson. And the end isn't yet in sight.

HEAVY LINE sloping from left to right in the chart above is a built-in scrap-improvement goal. It marks what can be expected when everybody takes dead aim on a single target—scrap reduction.

At Jones & Lamson Machine Company (Springfield, Vt.) this built-in goal is a key part of a Scrap Reduction Program (SRP) that has cut the scrap ratio some 65% in less than three years. For example, in the first 25 weeks following Oct. 4, 1953, when the goal was first set up, total scrap costs in one division dropped from $16,000 per week to $8000 (chart, opposite page). And that's only one gain from SRP. Other gains include:

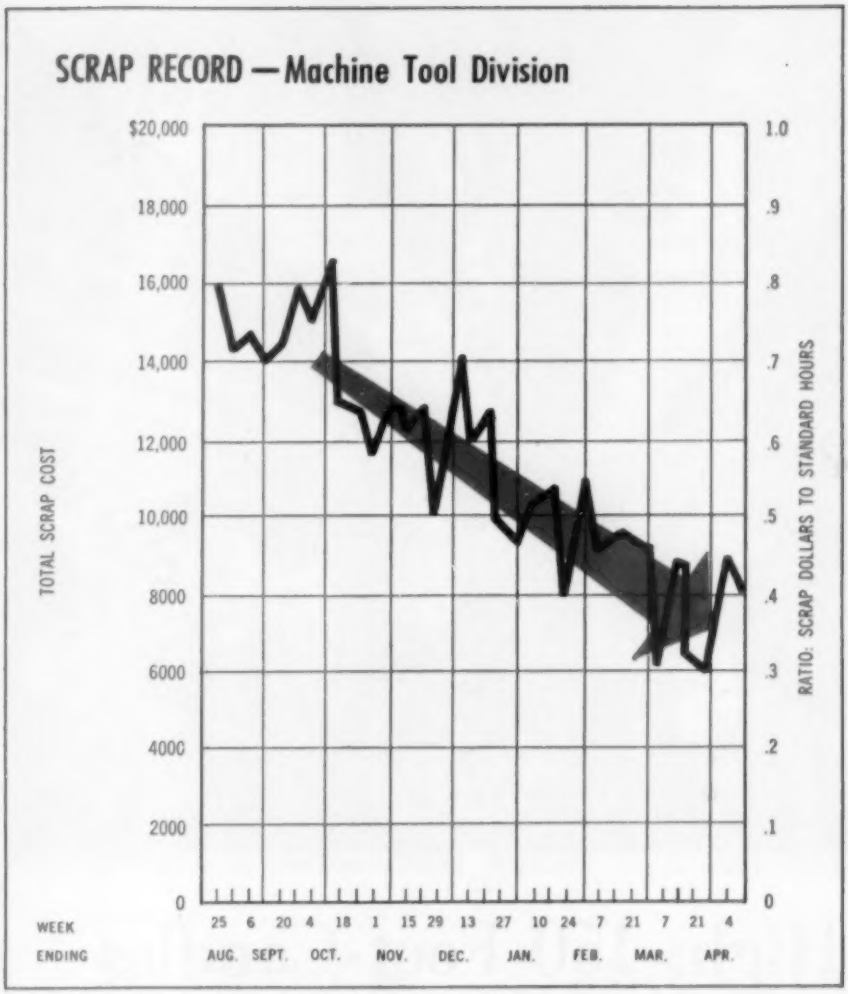
. . . *Less rework and salvage.*

. . . *Lower inspection costs* because less bad work is produced.

. . . *Better deliveries* because of less scrap and rework.

. . . *Steady productivity.* (There was a little lag right at the start, but only temporary.)

Drawing the line—Look again at the chart above (and the heavy line). It's for Department 24. (There are similar charts for every department and shift—day and night.) The chart is the principal



. . . scrap costs hit the toboggan

way of making foremen acutely conscious of scrap. Every week it records dollars of scrap and ratio of dollars to direct-labor hours. Dollars are posted by a red column; ratios by a circle. Circles from week to week are connected by lines.

What about the scrap-improvement goal—the heavy sloping line? To draw this line the company compiled historical data (8-week period at left of chart), then averaged the ratios for the reference period. From this average ratio the scrap-improvement goal line was projected to an end-of-year goal set by management. (End of year not shown.) For Department 24 the line was quite steep. For some other departments—with what seemed irreducible minimums—no slope at all.

Now look at the control limits (broken lines above and below the goal line). Jones & Lamson determined statistically the variation that could be expected each week, drew control lines (based on this variation) set at two standard deviations. Statistically, these deviations mean that normal variation will throw one in seven ratios out of control.

THREE-STEP START

First step in setting up SRP — Obtain a weekly cost-of-scrap report. This report (every Thursday) records all scrap found the previous week. It lists department and operator, number of part scrapped, number of pieces, cost of each part scrapped—and total scrap by operator, by department, and for the whole company. IBM machines handle data.

Second step — Make foremen aware of scrap by department scrap improvement records and goals.

Third step — Make operators aware of scrap costs. An operators' scrap chart for every department does this. It's a bar chart with names and clock numbers listed vertically. Scrap is posted cumulatively (by weeks) by projecting a red line to equal value of scrap each operator is responsible for. The cost scale is designed so that lines for high scrap operators will stretch off the chart before 10 weeks have passed. Operators' hours are posted on the same chart. Every 10 weeks operators' ratios are computed (scrap cost divided by hours). Then new charts are hung, with names listed in order of ratios — names with lowest ratios at the top; highest ratios, at bottom.

PUTTING SRP OVER

Here's how Jones & Lamson got going with SRP:

. . . *Kick-off* was by factory superintendent and manager of manufacturing at a foremen's meeting. Subjects: scrap costs, goals, charts, and records. Also computations.

. . . *Trickle-down came* in superintendent's meeting with foremen and operators of each department in turn. Subjects: same as above. Superintendent offered instruction before acting against operators with bad scrap records.

. . . *Trouble-shooters moved in* when need became clear after a few weeks. Company trained them in charts and quality-control methods.

. . . *Discovery of unsatisfactory conditions* followed: improper equipment, poorly ground tools, etc.

. . . *Analysis of troubles* was next move. Central trouble-shooter worked on chronic causes of scrap. Staff group was made responsible for success of SRP, was trained to analyze causes.

. . . *Recommendations came in* from staff group. For example, group showed that over half of scrap in one department came from set-up piece. Recommendation: that supervisors check set-ups for high-scrap operators before any metal is cut. Result: immediate and substantial reduction in scrap.

Brand-New High: 450 Foot-Candles

Trend report on two installations: a proved assembly area installation at Douglas Aircraft, and an experimental office installation at G-E.

REMEMBER 'WAY BACK (two years ago) when 100 foot-candles out in the shop was real news? FACTORY reported such an installation in its October 1954 issue. And in April 1955, 200 foot-candles made news. Now it's 450—at two installations, and in two different applications.

SHOP INSTALLATION

Before the installation shown above was made, assemblers and inspectors in the department shown above, at Douglas Aircraft's Torrance, Calif., facility, worked under one of the best lighting systems available. Light level on benches was 100 foot-candles—which even by today's exacting standards is far above average. But even this lighting was inadequate for some seeing tasks—like reading the identification numbers on terminals.

So in March of this year Douglas plant engineers installed the new 450-foot-candle system pictured above in a 40x70-ft. assembly and test area. (System is rated at 450. Actual reading at bench level after seven months of operation: 415 foot-candles.)

Results: all good—Though Douglas has no exact figures, there has been "a considerable increase in efficiency and accuracy of assembly." This is credited largely to the elimination of supplementary bench lighting, which required frequent adjustment as operators worked on different parts of an assembly. Worker morale: "appreciably higher."

Light provided by the new system is almost entirely shadow-free, makes toughest seeing jobs easy.

Problems: non-existent—There are a number of questions that are bound to be asked:

. . . *How's visual comfort?* Good. The new fixtures—bright as they are—are not a source of eyestrain because of the excellent diffusion. The egg-crate diffusers allow no light to strike the eyes at an angle less than 45 degrees. And comfort is in-

in Shop ◆ ...and Office ◆

creased since all light comes from behind worker.

Under the old arrangement, supplementary lighting was required, and when an operator adjusted his bench light just right for his job, it was not always satisfactory for workers across the bench.

. . . *What about heat?* It's negligible. Though area is not air-conditioned, there is no noticeable increase in heat at working level.

A factor in the cool operation of the new lamps: Slots cut in upper side of troffer. The slots, about 6 x ½ inches, spaced one per foot, provide a 10% upward component of light and—more important—provide a convection draft opening. This keeps fluorescent tubes 30 to 40% cooler, keeps tubes and troffers cleaner (maintaining brightness).

. . . *Maintenance costs up?* Not at all, report company engineers.

What is system?—The four-tube fixtures are 16½ inches wide, 8 feet long. They're mounted in continuous rows 7 feet, 2 inches off the floor, are centered slightly behind workers' heads. Fixtures are rated at 800 milliamperes. The new fixtures supplement the standard plant lighting, which in this area consists of continuous rows of 4-tube, 8-foot, 430-milliamp. fixtures without troffers, mounted 14 feet above the floor (visible in photo between rows of new fixtures).

OFFICE EXPERIMENT

Two lighting experts at G-E's Nela Park have installed a 450-foot-candle (at desk level) system in their office. Their reason? To test visual studies that indicate that is the best illumination level for reading.

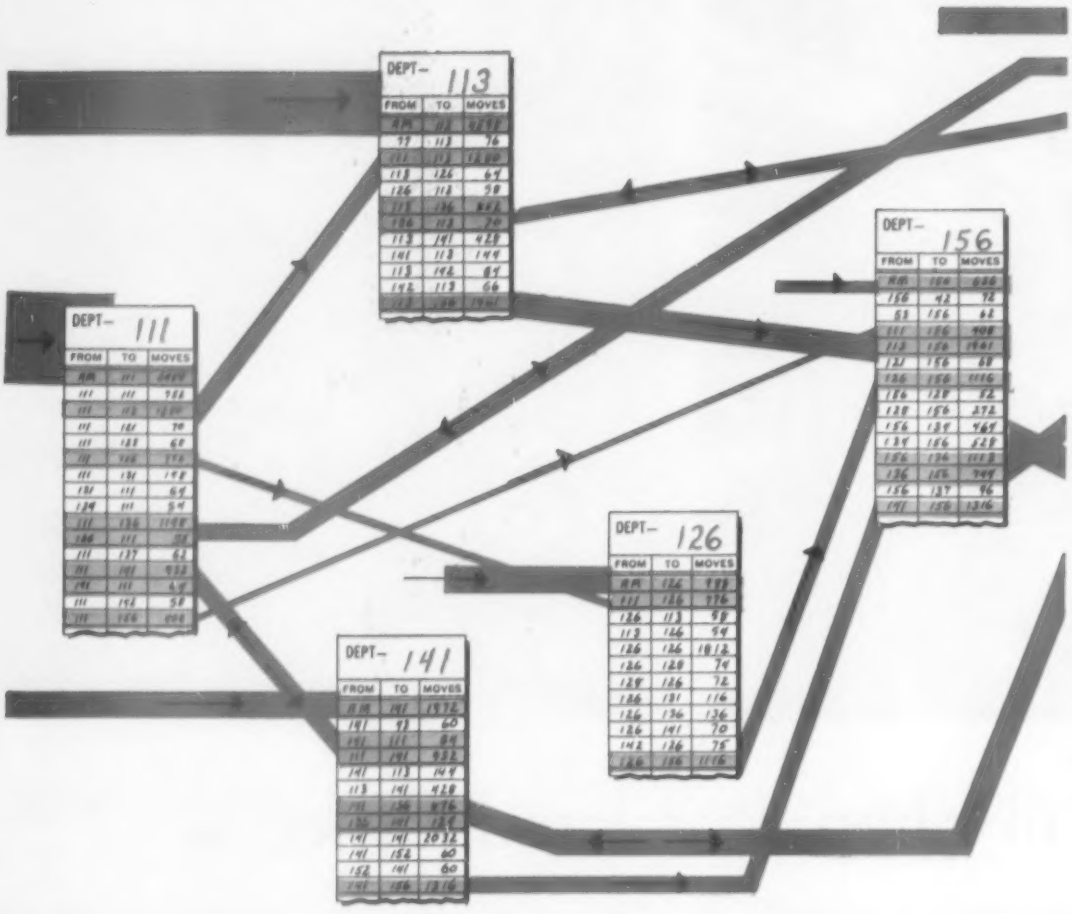
Fixtures used: two-lamp aluminum troffers, 12 inches wide, with standard 40-watt rapid-start lamps with dimming control. The fixtures are installed side by side, providing a continuous ceiling of egg-crate diffusers. Power load: 5400 watts, or 21 watts per square foot.

Because of the brightness, eye-jarring contrasts were carefully avoided in setting up the room.

The two engineers—and most of their visitors—find the room visually comfortable. But they admit that while radiant heat is not noticeable in the morning, it is in the afternoon. Troffers do get hot—thermocouple measurements of various parts of the troffers show maximum temperatures of 115 F. (Office is air-conditioned—12 air changes per hour.)

Reaction in brief: They say it's too early to tell whether they really like it. But, at any rate, their experiment is worth watching.

MATERIAL MOVES DETERMINE LOCATION OF MACHINES



This flow chart shows...

Best Way to Layout a Job Shop

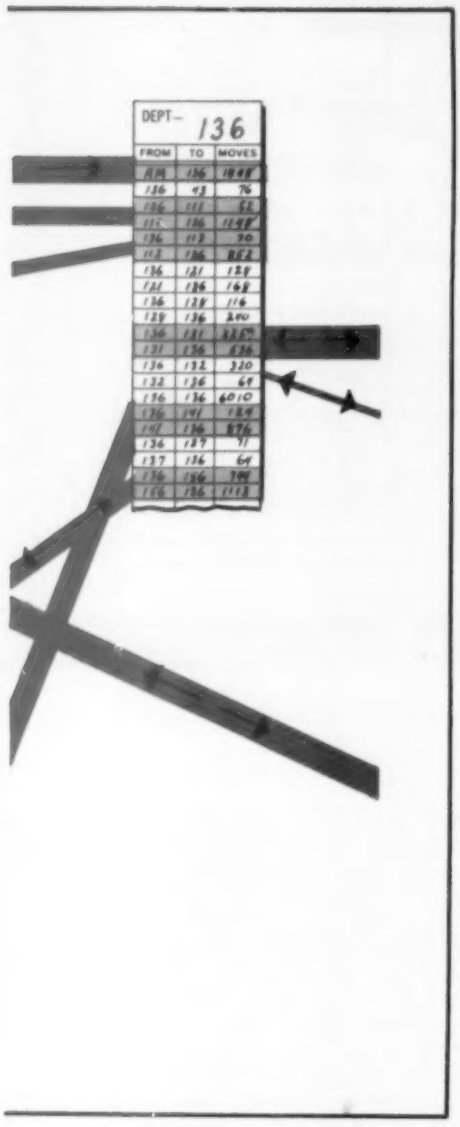
Now you can unsnarl those in-process traffic tangles. How? By getting—and using—the facts on flow. Here's how Bullard gets the best in layout for a big job shop.

THOSE heavy lines above? They're flow lines. They show movements of in-process materials among departments in a big job shop. The weight of any line is a measure of traffic between two departments.

Charts like this one—plus tabulating machines that handle data on material moves—are the prime tool in locating machines in our sprawling plant (The Bullard Company, Bridgeport, Conn.). The machines process data quickly. The charts help us visualize the meaning of data we gather.

Two years ago we started our new foundry building. We knew this

By GEORGE DOWNS
Plant Industrial Engineer
The Bullard Company, Bridgeport, Conn.



building would release 163,000 square feet of floor space for other manufacturing work. This would be a 49% increase in space for fabricating, assembling, and erecting. It would also give us a chance to rearrange our entire facilities to boost materials handling efficiency and cut costs. To find out how we could best revise our layout, we decided to analyze the flow of in-process materials.

APPROACH TO RELAYOUT

We wanted the most practical layout. But the scope of our problem was too broad (we have over 600 production machines) for empirical judgment. Our only possible answer, we saw, was to make a statistical survey—such as a flow-of-materials study.

We know many compaines use such studies to solve layout problems. But most of them have continuous-line facilities. Thus we had to face up to several complications other companies don't face:

. . . *We're a job shop.* We produce four basic types of heavy machine tools (many sizes, lots of modifications): single- and multi-spindle machines, horizontal tools, and a positioning device. Result: We fabricate over 10,000 parts.

. . . *We tool machines to each customer's production needs.* Thus we have many non-recurring items.

. . . *We were working only with the buildings we had*—not new ones. We had built our three principal structures (and auxiliaries) over a 40-year period as our operations gradually expanded.

. . . *We were midway in redesigning and standardizing* several products to achieve greater interchangeability of parts. In this way, we hoped to reduce the total number of parts fabricated. And we wanted our study to include newly designed parts as well as standard ones.

These were our obstacles. But we decided to use the flow-study technique anyhow. With it, we could determine the flow-of-materials patterns for 7800 base machine parts on a statistical basis. Our biggest problem: handling the information we collected. Why? Because our components average seven machining operations each.

So we turned to punched-card equipment. In the end, these punched cards eliminated hundreds of clerical man-hours and cut the over-all cost of our study.

TRIAL RUN

We made one on 3300 fabricated parts (about 40% of our operations) in a trial run late in 1954. It proved the validity of our approach. And it pointed out certain areas where revised operations would give us greater utility. Working part time, this dry run took three months to complete.

Benefits—Our flow study, plus high-speed punched-card tabulating equipment gave us two major benefits in our trial run—and later on in our final study covering over 7800 fabricated parts:

. . . *Flow patterns indicated we should divide our machining facilities into two major sections*—one to handle heavy parts; the other, light parts. By further subdividing light machining we found we could use two or three semi-continuous parallel production lines to fabricate shafts, rounds, and blocks.

We won't complete our new layout until next year. But this division suggests two major savings: (1) Materials handling between operations will be cut substantially; and (2) shorter traveling distances and elimination of in-process storage will minimize delays. But we won't know how much these savings will amount to until our layout project is completed next year.

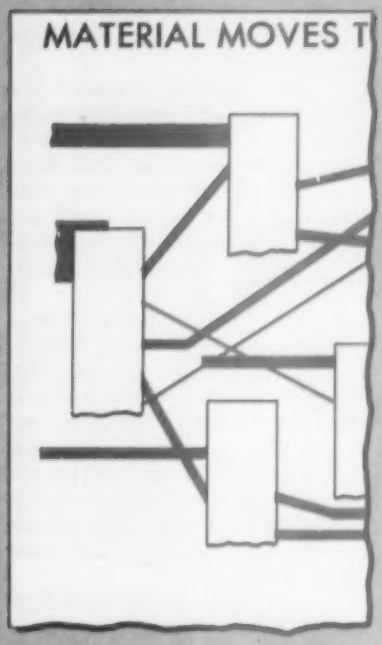
. . . *Punched-card equipment handled our paperwork in about 25% of the time required for manual computations and tabulating.* This permitted us to undertake a comprehensive statistical layout study without adding to our industrial engineering staff. Furthermore, the punched-card department handled this additional project without interrupting the regular schedule. All flow-study tabulations were done during slack periods—plus a small amount of overtime.

One engineer handled our entire flow study—gave it one-fourth of his time over a 10-month period. In addition, a clerk spent one-third of her time for eight weeks tabulating punched cards. Our office methods department supervisor also put in about four hours per week on this project.

As a by-product of our basic study, we found our approach useful in determining the right location for individual machines. For example, we recently installed a new 50-ton horizontal boring mill. By working up a simplified flow study we selected the most advantageous spot for this machine with a minimum of effort. Our tabulating department provided us with the flow data needed in less than two hours. Our final layout decision was made, presented to management, and approved, within two weeks of the day we received the problem.

Now, to find out in detail how we made our flow study—

Turn the page



FLOW PATTERN DATA — ALL MOVEMENTS

FROM ▼ / TO ▶	42	43	53	77	111	113	121	123	126	128	131	132
RM	40	8			6954	4598	8		988	976	280	136
42	1180	316								4		
43	108	4									4	
53												
77						76						
111					752	1280	70	68	776		148	
113									64			
121							8				48	18
123								20			30	50
126						58			1812	74	116	
128		4					12		72	1226	738	48
131		232	12		64		110	20		188	3006	392
132	8	30					8			24	984	646
134	4	36			54		116			4	60	
136		76			52	70	128			116	2259	64
137							28	154		24	586	638
141		60			64	144					32	
142		120				66			75			
152	8	12									132	
156	72									52		

For easy flow ... get all the facts on traffic...

Begins on page 100

How we made our flow study

Here's a step-by-step rundown of our flow-study procedure at Bullard. Actually, it's much like recommended standard procedures for obtaining plant layout data. But we incorporated several variations and refinements that permitted us to use tabulating equipment to handle a lot of the paperwork. The flow diagrams that grew from this flow study are the basis for our relayout. Our six-step procedure follows:

Classify and code parts—We divided all basic components and commonly used special attachments of our finished machines into five classifications: shafts, rounds, housings, sheet-metal parts and squares, flats and rectangles. To each classification we gave a materials-handling code number. Then we subdivided each classification into two or three large groups according to weight and size, and assigned a secondary code number to each sub-class. In assigning primary and secondary numbers we also considered sequence of machining operations as well as shape, size, and weight. We set up these codes to identify parts-lot movements on tabulating cards.

Forecast production schedule—Top management provided these figures for each end product. The figures represented their best thinking on the company's future yearly output by product line. Production control then broke these figures down by individual components. This information, together with our standard data, helped us determine the machine hours each part needed at each production load center. We used these data in our final step, described later.

Program and process the data—Here we began using punched cards. Wherever possible we used information we had in the form we had it in. We abstracted this from punched cards already in use, then entered it (or data computed from it) on a master card. On the master card we recorded facts peculiar to our flow study. Thus each master card contained all the information we needed about the movements of one part or component to and during one production operation. It also contained other data relating to the part and the operation (e.g., economic lot size, set-up time, yearly machining time). But a separate card for each part covers movement of raw materials from storage to first machining operation. Since each part passes through an average of seven operations, we used over 50,000 cards for our master file alone.

From our raw-materials movement cards we tabulated a report tracing movements of all raw stock. This told us just how many lot movements per year went to each first machining department. It will help us decide whether centralized or decentralized raw-material storage is more efficient for our operation.

From master cards we compiled three reports. These cover subsequent movement of parts through manufacturing—but each uses a different basis for tracing flow patterns.

... Report A contains flow-pattern data on all movements. It traces the flow of all individual lot movements per year to and from each

DEPT– 111

FROM	TO	MOVES
RM	111	6954
111	111	752
111	113	1280
111	121	70
111	123	68
111	126	776
111	131	148
131	111	64
134	111	54
111	136	1148
136	111	52
111	137	62
111	141	932
141	111	64
111	142	58
111	156	408

then break 'em down.

department. It also covers intra-department lot movements. We now identify fabricating departments by functions of their machines—drilling, milling, etc.

. . . Report B gives flow pattern data by materials-handling code. It's a group of reports—one for each primary and secondary materials-handling code combination. Each report traces the flow of lot movements per year from department to department for a specific materials-handling class. It shows whether parts with similar codes will follow similar inter-department flow patterns. If they do, some division in production facilities may be wise. For instance, we found light and heavy parts should be produced in different sections.

. . . Report C gives flow pattern by load centers. It's a group of reports tracing flow of lot movements per year by a particular materials-handling class. But these reports examine movement to and from individual load centers rather than departments. (At Bullard a load center is a group of one or more fabricating machines of the same capacity or type.) Similar flow patterns of lot movements indicate the possibility of continuous or semi-continuous production lines.

Prepare lot-movement charts—We got the figures from the flow-pattern reports described above. We prepared these charts in two steps—one covering the over-all plant, the other a department or load center. First we made worksheet summaries of data on all materials movements in the plant (illustration at right, opposite page, shows part of a department-to-department worksheet for all raw materials and in-process parts). Similar worksheets derived from the other two flow-pattern reports summarized (according to materials-handling code) lot movements from department to department and load center to load center. Each chart tells exactly how many lot movements travel between two operations over a year's time.

Next we broke down the data on the summary worksheets by smaller units (departments and load centers). You'll see a breakdown for Department 111 in the illustration on this page. In transferring figures from summary worksheet to departmental data listing we dropped lot movements of 50 per year or fewer. We did this because such movements (less than one per week) shouldn't affect our over-all layout plans one way or another.

On these small tickets we summarize all significant lot movements of materials and parts to and from the department for a year. Look again at the illustration. In Department 111 all incoming lot movements (6954) come from raw-materials storage (RM). There are 752 lot movements within the department itself. Material lots from Department 111 move on to many other fabricating departments. The four largest receivers are Departments 113, 136, 141, and 126.

Organize flow-diagram charts—We did this by arranging department (or load center) summary tickets on a 3x6-ft. sheet of layout paper, then making a flow diagram. For example, look at the small section of a diagram at the left (opposite page) and the larger section on pp.100-101. The diagram shows the movement of all parts. Lines connecting departments illustrate direction of lot-movement flow and rate of flow (thickness of line). We also made diagrams similar to this one to show the lot movement of different materials-handling code combinations throughout our plant.

To see how we located departments on our flow diagrams, examine the position of Department 111. This department receives all its supplies from raw-materials storage. Materials flow is from left to right in our diagrams, so we located Department 111 directly to the right of our raw-materials storage area.

The four largest lot movements of parts from Department 111 go to Departments 113, 136, 141, 126. That's why we placed Departments 113, 141, and 126 directly at the right of Department 111. But Department 136 is located farther over, even though many of its incoming supply lots come from raw-materials storage and Department 111. Why? Because Department 136 also receives a lot of material from Department 113. And also has a back-and-forth flow with Department 156. The double arrow (illustration, pp. 100-101) indicates this two-way flow between departments.

By studying different flow diagrams of yearly lot movements we shape our general layout scheme for the plant. Of course, this has to be a compromise plan because it's impossible in any job shop to make a layout to satisfy all requirements for optimum efficiency.

Prepare load-center size data—This is our final step. Using our master card file again we calculate how many of each type of machine we need in various locations in the plant. We know the yearly production capacity needed to produce each part. We can easily interpret these two facts into actual machines. At present we are just completing our work on this phase.

From now on we expect our layout revisions to follow conventional procedures. In the very near future we will prepare rough area layouts, using our flow diagrams and load-center capacity figures as a guide. Next, we expect to make our proposals for detailed equipment layout. These, together with auxiliary service plans, will be incorporated into our final over-all layout plan. Naturally, top management reviews progress periodically.

We don't expect to complete our final layout for several months. But we are sure of one thing: When done it will represent up-to-the minute thinking in job-shop layout.

1960 Look for Factory Workers?

It's cool, man, cool. You may be seeing it soon in your plant. "And why not?" we ask.

YOU'RE LOOKING at the factory Beau Brummel, 1960 style (photos, right). Dig those slimline work trousers. Those tailored shirts, turn-back cuffs. Those patch pockets with the badge-tab. Don't those jazzy colors make you flip?

These clothes make the first big fashion news for working men since blue jeans replaced overalls. They aren't for sale yet. But they may be soon. They're the brain child of Waldes Kohinoor, Inc. (a Long Island City, N.Y., fastener company). They're designed as a service to apparel manufacturers—and to stimulate production for the market.

The styling is based on a study that shows . . .

. . . *Male workers* in plants no longer stick to conventional work clothes.

. . . *Many men prefer* (and their jobs permit them) to wear sport clothes—colorful, comfortable, easy to care for.

The new clothing goes right along with the trend. It combines practicality and rugged material with style and color. Trouser materials, for example, are hard-wearing denim, twill, corduroy, duck, sailcloth. Shirts are denim, gingham, cotton flannel, and knit. Colors make mix-and-match combinations easy to choose.

Materials and designs are low-cost, so clothes will reach markets at a price working men can afford.

WELL-DRESSED factory worker will wear made-for-the-job shirt like this prototype. Note tab (worn inside pocket or out) for identification badge.

RUGGED, PRACTICAL materials for this smart-styled battle jacket include long-life denim for jacket and trousers, sailcloth for shirt.

ZOOTY JACKET will appeal to Elvis Presley set among younger factory workers. Note the criss-cross belt loops, diagonal pockets on pants, and the contrasting bright colors of the shirt.

THE CONTINENTAL influence shows up in the roll collar and in the pants with a high-rise waistband. Shirt is ivy-colored cotton. Slacks are of harmonizing dark green sailcloth.

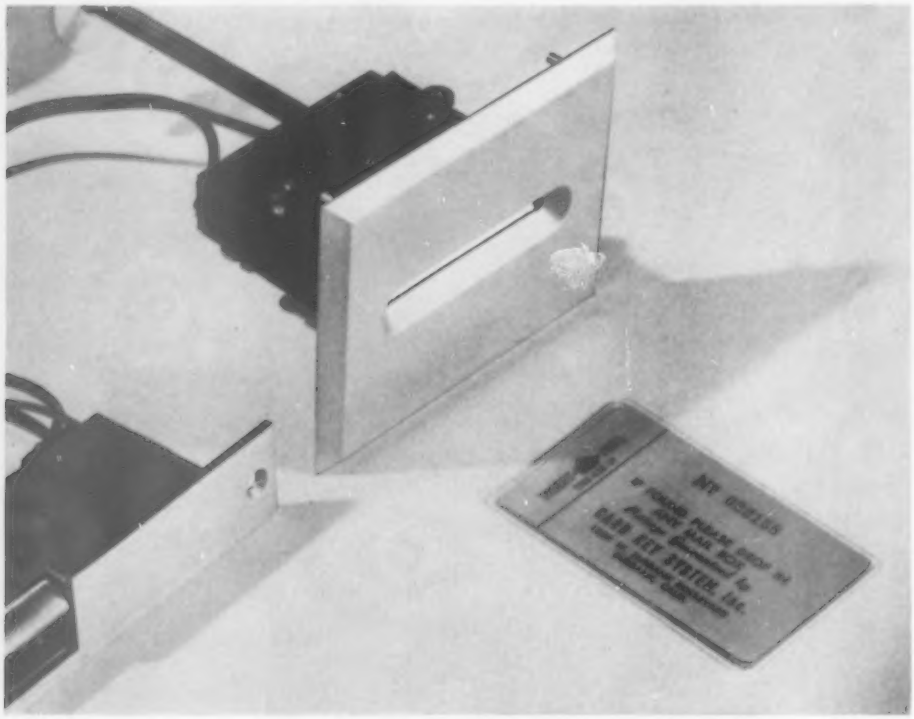
THE MOST is hep-cat word for this outfit, which features bell-bottom jacket sleeves that may be rolled, trousers with stitched-down creases, and extra heavy loops for the belt.

CRAZY COLORS feature a shirt worn with neck open or closed. Zipper closure eliminates buttons that might get entangled in machinery. Trousers have deep pockets in front as well as back.

GRAY-FLANNEL LOOK will suit the conservative factory worker. Note the button-down collar on this one-piece shirt. Trousers are made without cuffs. Slim lines make worker safer on the job.

SHARP LOOK for summer wear in the plant will be this orange chambray shirt with short-slashed sleeves that can be turned back and cuffed. Slide fastener opens and closes neck of shirt.

Now — Only the Right People Get in →



With . . .

The Card That's a Guard

Your plant will be safe as a bank—inside and out—with this slick new security system. It's simple, air-tight, low-cost.

PARKING LOT—Only certain cars, driven by owners of coded card (same as ID card) can park in this lot. Card excites electric impulse, opens gate.

TAKE A CARD and a slot as shown above. Slip the right card into the right slot—and open the lock (photos on opposite page). That's how "Card Key," a brand-new plant protection system, works.

Sound easy? It is, say those who use it. Yet they consider it safer than a conventional lock-and-key system. It's now replacing guards in many plants in the Los Angeles area. Being used for perimeter access and for access to closed (secret) areas. It has proved to be:

. . . *Foolproof*. Anybody can take a key to the nearest locksmith and

By JOHN SHINN
McGraw-Hill News Bureau
Los Angeles

GENERAL ADMISSION—Lots of men (if they're the right ones) pass through employees' entrance by slipping coded card into a slot equipped with an electronic scanner.

RESERVED SECTION—Entrance to confidential file room is limited to a few trusted people who have uniquely coded cards. Door opens only for these special cards.

get a duplicate. But not these cards. To duplicate them is a highly technical (and secret) matter.

. . . *Convenient*. No clumsy bunch of keys to bother with.

. . . *Easy to change*. If cards get mixed up or lost, the secret electronic combination can be changed quickly, old cards taken up, new ones issued. About a million combinations are possible—enough to guarantee an exclusive code to any plant.

. . . *Adaptable*. Suitable not only for doors but even for the parking lot—or turnstiles.

. . . *Inexpensive*. Locks are rented (not sold) at $10 a month, with a supply of cards to start with. A lot cheaper than plant guards.

How "Card Key" works—All you see is a slot in a small wall plate. Behind that plate is an electro-magnetic scanner that takes a fast look at the card when it's slipped into the slot, responds favorably to the right card—and only the right card—by sending out an electrical impulse that opens the lock. Just like a buzzer or any other remote control system.

Cards are same size, same shape as the familiar ID (identification) card, and made of plastic-sealed cardboard. Their secret: minute metal particles (not visible, not even big enough to feel) arranged in a pattern in the business end of the card. The pattern will activate a scanner set for that pattern only. Nobody except the maker (Card Key Systems, Inc., Burbank, Calif.) knows the pattern.

Any one card may contain several patterns. For example, the card issued to Joe Jones, production worker, will pass him through Lock A into a production area. File Clerk Mary Smith uses her card to pass through Lock B to a confidential file room. But Plant Manager Richard Roe's card opens Locks A and B—and as many others as needed for his job.

Where it's used—For perimeter access it's doubtful that government security officers would permit Card Key to replace guards entirely, especially if the plant's work force is large.

But for interior security the cards meet most Defense Department regulations. For one thing, cards are issued only to responsible persons who'll take care of them. For another, only the holder knows what locks his card will open. What's more, Card Key, Inc., will make cards without any company identification—i.e., with just the return address of Card Key, Inc., or its local distributor. A coded number on the card tells Card Key, Inc., what plant the card belongs to. If desired, however, the card may carry the usual visible ID information.

Now, for examples of Card Key use, turn the page

Begins on page 106

How the card that's a guard protects 4 plants

Plant Protection—and Laggard Employees

Plant — Wiancko Engineering Company, Pasadena, Calif.

Problems—Security for classified Air Force work, and also protection for company secrets (methods for making dynamic measuring systems and components). And employee tardiness at start of shifts and after lunch and coffee breaks.

Solution—Card-Key lock guards employee entrance to plant. But Wiancko has tied it in with a time-clock, fixed it so it will respond to Card Keys only at set times—beginning and end of shifts, during lunch and coffee breaks. This way, Johnny-come-latelies can't get in through the employees' door—must go through front door, past receptionist, and possibly past company brass. Embarrassing, to say the least. Another thing: Cards work only at time when traffic is heavy, thus guarantee somebody will be around to recognize any stranger.

Right now, cards of day and night shifts are identical. But Wiancko expects to change soon, install a system with different cards for day and night. A timer will shift scanner combination at fixed morning and evening hours. Executive cards will contain both combinations. Wiancko cards bear Card-Key return address, no company name.

Benefits—Employees get back to work on time. And Air Force Security officials accept fact that side door has only a Card-Key lock.

Parking-Lot Operation

Plant — Eastman Kodak, Hollywood, Calif.

Problem — Near this processing lab parking space is at a premium. Free loaders pile into any open lot.

Solution — A Card-Key system that raises a parking-lot gate when the right card is shoved into the slot (photo, p. 106). A treadle inside gate closes it when a car enters, raises it when a car approaches exit. A treadle outside gate will only close it behind a retreating car. This way, the card is used only for entering the lot.

The lot holds 100 cars—40 Kodak cars, 60 divided among three tenants. Kodak and each of the tenants have different combinations. When a tenant drops his lease, Kodak picks up cards issued to him, adjusts lock for new combination, issues new cards to new tenant. Other three sets of cards still work. Card Keys also serve as ID cards for entrance to lab and tenant's properties. This way, parking-lot card can't be left stuck in visor of car for non-Kodak buddy to pick up and use in the private lot.

Benefit—Kodak and tenants have private parking lot without expense of guard.

Defense Secrets—and Company Secrets, Too

Plant — Douglas Aircraft, Santa Monica, Calif.

Problems — Top secret defense work (preliminary design of missiles, for example), commercial secrets (design of the DC-8, Douglas's jet transport), and the in-plant visiting nuisance (kibitzers who amble into the photo lab, interfere with work, for instance).

Solution — Douglas keeps 16 Card-Key locks on hand, moves them around as needed. They're easy to move—a big merit because space is at a premium and space needs change during the various stages of design and production.

Cards bear the names of company and employee. Why? Douglas figures its card-holders are reliable. will safeguard their cards. Only the authorized employee knows which lock his card fits. Each scanner at Douglas has three combinations, any one of which can be brought into play by a simple control adjustment. If a card is lost Douglas just shifts the combination on the lock, calls in old cards, issues new ones.

Benefits—Douglas saves money. Without Card Key there'd have to be a guard at every card-controlled door. In places where daytime traffic is heavy, a guard works the first shift, cards are used only on second shift. Says E. L. Manning, head of Lock and Badge Control: "We did a lot of checking before we went in for Card Key. We asked our experimental group to beat the system. They're a smart bunch. But they couldn't beat it."

Plant Security—and Ventilation

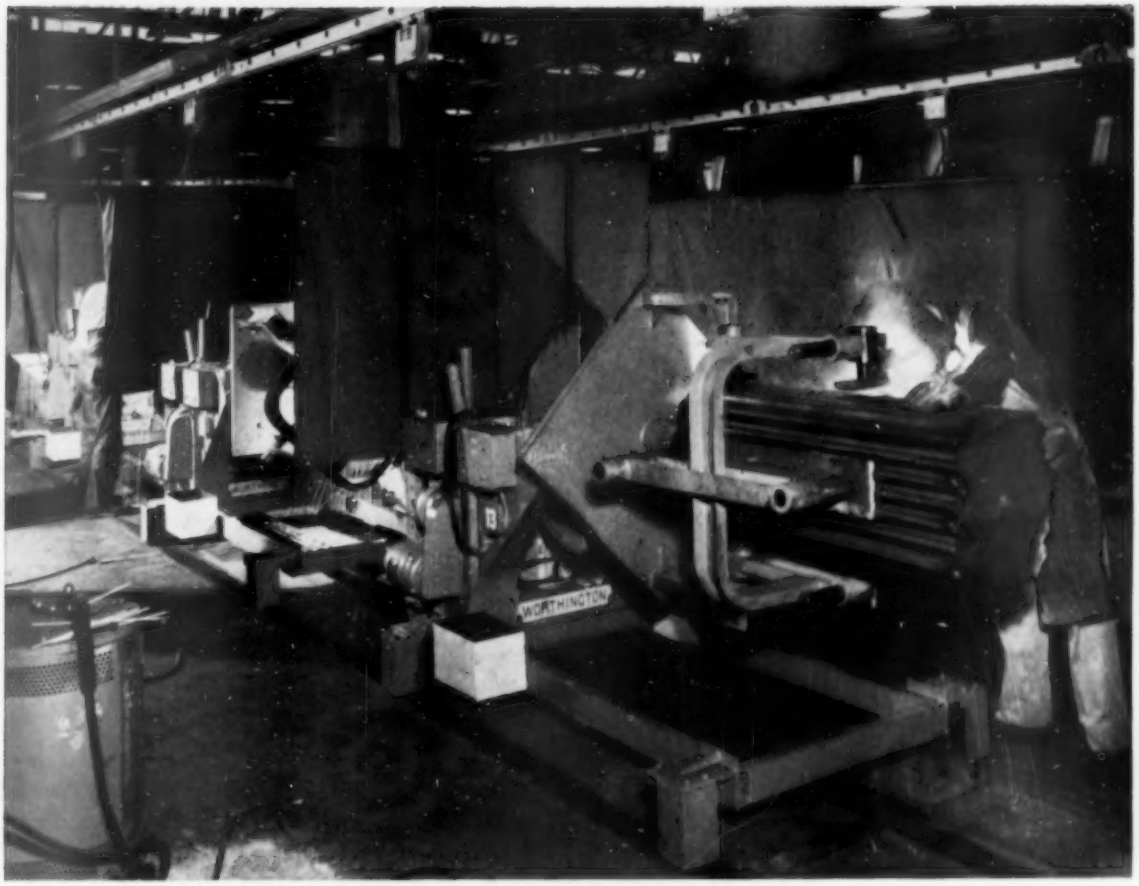
Plant — Coleman Engineering Company, Culver City, Calif.

Problem — Coleman has a few production items (e.g., "Digitizer," an analog-to-digital converter), but does weapons-system engineering and lab work mostly. Unusual puzzler: A big overhead sliding door for drive-in of heavy equipment created a ventilation problem when closed, a security problem if open.

Solution—Coleman has six Card-Key locks with two combinations. "A" cards open entrances to general offices, engineering, and shop areas in Plants 1 and 2, fit four locks—front and side doors of each building. "B" cards unlock front and rear doors of a secret area for weapons engineering and lab work.

Now the ventilation solution. A louvered fence is used in summer, when the big overhead door would cut off ventilation. Opening is 9½ feet high, 16½ feet wide. The fence, 6½ feet high, is padlocked to wall at both ends, and is removed only for heavy equipment. It bars the entrance. Louvers keep prying eyes out. A small personnel door in fence operates on a Card-Key lock. In winter the big door is kept closed but unlocked. That way, the fence is in control the year round.

Benefits—Coleman used to have buzzer doors (opened by receptionists) off lobbies, kept side doors locked. Buzzers took a lot of receptionists' time, and unauthorized persons could get through in a rush. Using front door was inconvenient for some personnel. And there was danger side doors might be left unlocked. Coleman now figures Card Key has solved these problems. Coleman uses cards without company identification. Only card lost was mailed back to Card-Key.



WORK, FIXTURE, AND SIDE SHIELDS INDEX FROM WELDER TO WELDER ON SET CYCLE. AS A RESULT . . .

Conveyer Ups Welding Output 100%

That's the eye-opening score racked up by Airtemp when it broke a welding job down into small pieces, put it on a conveyorized, mass-production basis.

IF YOU NEED ANY, here's new proof that line production methods pay. At Chrysler's Airtemp Division (Dayton, Ohio) furnace heat exchangers used to be welded in the conventional way: Welders worked at stationary fixtures, each completed an entire unit. But, recently, company engineers decided to put the fixtures on a drag-chain conveyor. On a predetermined cycle, the whole work station (heat exchanger being worked on, fixture, and side shield) indexes, passing the work along a line of manual arc welders. Each worker on the line is responsible for a portion of the welding job. The work load is carefully equalized (not hard to do since all the work is similar). Temporary tacking is done before the work is loaded on the conveyor.

Installation of the merry-go-round conveyor has produced a *100% increase in production per man.* Reasons for this increase are complex, hard to identify. They may include greater specialization of skills, less fatigue as a result of the shorter work cycle, greater motivation because of the movement of the work on a definite schedule.

The indexing interval can be set from one to 20 minutes. In practice, to date, settings have ranged from 2.333 minutes to 6.5 minutes, depending on production schedule. Setting is done by a manual rheostat. Conveyor drive is d-c.

The conveyor has 15 stations, but the first and last are for loading and unloading. The 13 work stations are not all used at all times, since heater production is somewhat seasonal. Conversely, more than one welder at a time is able to work at each station when production schedules reach their peak periods.

FACTORY | IDEAS OF THE MONTH

BY LEWIS K. URQUHART, Managing Editor, FACTORY

For coffee breaks you may want to try the new self-service packs introduced by the Nestle Co. (201 E. 44 St., New York)—instant coffee, chicken and beef bouillon, cocoa. The Nescafe comes in an aluminum foil envelope with separate sections for coffee, sugar, and Nescreme.

If you're planning to mark pipes you'll want the planning kit now being distributed by W. H. Brady Co. (727 W. Glendale Ave., Milwaukee 9) which makes self-sticking pipe markers.

44 Alundum is a brand-new non-premium-priced abrasive (Norton Co., Worcester 6, Mass.). And grinding wheels made of this material offer such dollar-saving benefits as longer life, more work pieces per dressing, better finish, faster cut, cooler cut and more production per wheel.

Cartoons for bulletin boards? Workers should go for the excellent ones offered by National Foremen's Institute, New London, Conn.

Original luster of glass-fiber panels can be restored by applying Resolac, a new air-drying plastic lacquer (Resolite Corp., Zelienople, Pa.). Clear and seven colors. Can also be used to deepen color, thus reducing light and heat transmission. Gallon ($9.80) covers 400 sq. ft.

Now you can buy posters in aluminum frames holding from 12 to 52 messages. At the end of a month—or a week—tear out the top poster and the new one is already in place. Posters, Inc., 2909 N. Grand Blvd., Detroit 2.

Newest leak detector is bromocresol purple. Boeing Airplane Co. (Seattle) is using it to find leaks in fuel tanks. The chemical is sprayed or brushed on the outside of a tank pressurized with ammonia fumes. If there's a leak anywhere, the yellow coating at that point turns purple.

Pocket Pager is a handy-dandy transistor-equipped receiver that weighs less than 3 oz., can be clipped to a shirt pocket. Just the thing for getting messages to personnel on the move without disturbing others. No raucous bells, no blaring loudspeaker. The Transvox Corp., 4 E. 43rd St., New York 17.

Portapage, on the other hand, has a loudspeaker (9¼ lb.) that can be heard half a mile away. Sound-Craft Systems, 661 Rochester Rd., Pittsburgh 2.

Your payroll people will go for either the standard or the one-deduction tax-finding board made by Graphic Calculator Co., 633-A Plymouth Court, Chicago 5. These boards show at a glance, separately or combined, the 1957 Withholding Tax and Social Security deductions. Either board costs $7.65.

Safety wheel blocks are bound to be safer when they're equipped with vertical standards carrying a warning sign that tells the loader whether or not the truck is securely anchored. Calumet Steel Castings Corp., Hammond, Ind.

Hansotex is a new acoustical ceiling material (Elof Hansson, Inc., 711 Third Ave., New York 17). Sound-absorbing element is permanently bonded to aluminum face which is finished in glare-free baked enamel. Decorative embossed pattern. Easily installed and maintained.

New slotted steel angle (Orchard Bros., Rutherford, N. J.) is stocked in aluminum, white, wrought-iron black. Other colors on special orders.

Lantuck is a non-woven, random-fiber fabric (Wellington Sears Co., 56 Worth St., New York) with any number of industrial applications. Comes in a wide variety of weights, fiber content, gages, and densities. Free booklet.

Booklet of the month is "Dollar Savings Through Standards" (American Standards Assoc., 70 E. 45 St., New York 17). This 40-page survey report highlights the economic benefits to industry that result from the use of standards, contains 79 documented case studies in 27 industrial fields.

No fingers squashed in your doors if they're equipped with the new vinyl plastic Fing-R-Gard edge (Overly Mfg. Co., Greensburg, Pa.) It's shaped like a "U" and is applied to the door's entire length. Completely weatherproof.

How about that portable warehouse developed by U. S. Rubber Co. (Rockefeller Center, New York 20)? It's made of Fiberthin, a tough nylon fabric —and it's entirely supported by air. Contains 64,000 cu. ft. of storage space. Weighs 400 lb. Three men can set it up in an hour's time.

Another booklet you should have is "Employers' Rights and Obligations Under the Taft-Hartley Act." Single copies 25¢. National Association of Manufacturers, 2 E. 48th St., New York 17.

Of course you know all about cellulose acetate work-ticket holders. If you don't, Glenfield Plastics, Inc., Beaver Falls, N. Y., will be glad to brief you on its favorite subject.

Have you been exposed to "Just Between Office Girls"? It's a monthly service recently inaugurated by Bureau of Business Practice (100 Garfield Ave., New London, Conn.) and may be what you're looking for.

More Ideas of the Month in Press Time Report, following p. 80

Here's the theory behind G-E's new pay plan for

FIGURE EFFICIENCY LEVELS AT BELOW MINIMUM LOT SIZES . . .				ADD REGULAR INCENTIVE ALLOWANCES . . .		
1	2	3	4	5	6	
LET MINIMUM LOT SIZE (X)=1000 UNITS, THEN . . .	EFFICIENCY AT EACH LEVEL (TESTS SHOW) WILL BE . . .	PRODUCTION TIME AT 100% EFFICIENCY WOULD BE . . .	BUT AT ACTUAL EFFICIENCY, PRODUCTION TIME WILL BE (COL. 3÷2) . . .	G-E ADDS JOB ALLOWANCE OF 10 MINUTES	AND ADDS A 7% PERSONAL ALLOWANCE	
(X)=1000	100%	100 MIN.	100 MIN.	100 MIN.	117.7	
.7(X)= 700	96	70	73	83	88.8	
.5(X)= 500	93	50	53.8	63.8	68.3	
.3(X)= 300	88	30	34.0	44.0	47.1	
.1(X)= 100	83	10	12.0	22.0	23.5	

Newest Way to Pay for Short-

Many companies fall back on daywork for short-order jobs. Which pleases neither management nor workers. Here's a better, and very workable, idea.

IS A PUZZLEMENT (to quote the King of Siam): How to pay for those short-run jobs that crop up from time to time. Time standards are usually established on the basis of a minimum normal lot size, take into account the fact that most workers require some time to build up to 100% efficiency. On short-run jobs, the average worker never does get up to normal rhythm and pace before the job is finished. So he never reaches standard, much less has an opportunity to earn incentive pay.

Common solution? You can fall back on daywork. But workers don't like it—because it eliminates the possibility of extra earnings. On the other hand, management doesn't like the increase in unit costs that results.

Better solution—Establish extra allowances for short-run jobs. Many such plans have been tried. Many have not worked out. But here at G-E Bridgeport we've got one that works fine: *By giving the operators an incentive to keep their effort at a high level, it has increased their take-home pay, and has sharply reduced manufacturing costs on short-run jobs.*

Chart above shows the development and results of our system. It works like this:

1 **Figure efficiency levels** at below-minimum lot size. If we work on the premise that 100% efficiency (standard performance) will be reached at minimum standard lot size (X), columns 1 and 2 above show the actual efficiency level at various lot sizes smaller than (X). These percentage efficiencies are based on careful studies which show that the average incentive worker starts a job at an efficiency of about 80%, gradually levels off at about 120%.

The next two columns (3 and 4) show the effect of this lowered efficiency, at small lot sizes, on production time. If we assume a standard time of 0.10 minutes per unit, you'd expect it to take 70 minutes to make 700 of them. But 700 is only 0.70(X)—seven-tenths of the standard minimum lot size. And the efficiency level at 0.7(X) is 96%. So actually, it would not take 70 minutes, but *73*, to make 700 of them. ,

2 **Add regular incentive allowances.** There are two types:

. . . *Job allowances.* This covers such interruptions and delays as awaiting new assignments or transfers to new jobs, waiting while minor job changes are made, waiting for job information and instruction, rearranging parts, refilling trays, and the like. For long production runs, the pattern has been to add a 2% or 3% allowance (10 to 15 minutes per day) for delays. But we've found that these delays do not decrease proportionally on short-run jobs—are relatively fixed regardless of the length of the run. Observations on many factory jobs indicated that these losses ranged from 6 to 13 minutes per job. In the development of our system, these losses have been included at an average 10 minutes per job (see col. 5 above).

By H. C. GEPPINGER, Specialist, Time Standards, Wire & Cable Dept., General Electric Co., Bridgeport, Conn.

short run jobs...

7	ESTABLISH ALLOWANCES 8
SO, ALLOWED TIME PER 1000 UNITS IS . . .	THIS IS AN ADDITION TO NORMAL TIME OF . . .
117.7	0
127.0	7.95%
136.6	16.08%
157.0	33.4%
235.0	100%

and the standards it developed for extra pay...

LOT SIZE	ADD TO NORMAL TIME STANDARD	LOT SIZE	ADD TO NORMAL TIME STANDARD
.99 TO 70(X)	4%	.29 TO .25(X)	36%
.69 TO 50(X)	12	.24 TO .20(X)	46
.49 TO 40(X)	19	.19 TO .15(X)	61
.39 TO 30(X)	27	.14 TO .10(X)	87

and for minimum lot size...

(X) VALUE	IF CYCLE TIME IS	(X) VALUE	IF CYCLE TIME IS
1000	0.00 TO 0.20 MIN/UNIT	500	0.41 TO 0.60 MIN/UNIT
700	0.21 TO 0.40 " "	300	0.61 TO 1.00 " "

Run Jobs

. . . *Percentage allowances.* All time standards are commonly adjusted to include delays for personal needs, make-ready, clean-up. At 5% for the first, 2% for the latter, these allowances are figured at 7% regardless of length of run, since these delays are related to the work day rather than to lot size (col. 6).

3 **Establish a short-order allowance table.** The effect of efficiency levels and allowances at various lot sizes is summarized in col. 7 above. And, by calculation from col. 7, the additions to normal time standards for lot sizes smaller than "minimum (X)" appear in col. 8.

To simplify the application of allowances, a standard table has been drawn up. It's shown in the standards table above right.

There's now just one missing link:

4 **Determine "minimum lot size."** Criteria for establishing "minimum lot size" or "normal quantity" below which these short-order allowances apply are difficult to evaluate. Samples: time of repetitive cycle, number of like elements in cycle, proportion of manual and machine functions in cycle, simplicity or complexity of process, degree to which manufacturing processes of similar jobs differ from each other.

These and other job conditions made it impossible for us to develop a simple, usable rule for determining "minimum lot size (X)." So we decided to make studies on the shop floor. They indicated that experienced incentive workers attained "normal performance" as follows:

. . . *On simple, short-cycle jobs,* within 1 to 2 hours.

. . . *On longer, more difficult jobs,* within 3 to 4 hours.

From the results of these studies, we decided to base "minimum lot size" on cycle time. Standards are shown in the lot size table directly above.

Although this system gives no scientific solution, it has produced satisfactory results on a great variety of factory operations. We use it with predetermined standards (Dimensional Motion Time system in our case), and it has greatly increased our incentive coverage.

How standards are applied...

Best way to show just how easy it is to apply this empirical system is to cite a typical example:

The design of an electrical control panel was radically changed. Production was cut back sharply. Lots of 100 were to be made to provide customer service. Here's how additions to the normal standard—13.3 hours per 1000 units—were calculated:

Normal standard—13.3 hours/1000
—798 minutes/1000
—0.798 minutes/unit

"Minimum lot size (X)"—300 units (standard minimum for cycle times between 0.61 and 1.00 minutes/unit)

Actual lot size—100 unit
—.33(X)

Since 0.33(X) is between 0.30(X) and 0.40(X), addition to normal time standard is 27% (see tables above right). Addition to standard —13.3X.27 —3.6 hours/1000 units.

PROGRESS DISPLAYS—Every month Motorola employees can check their scrap reduction efforts against progress displays that are set up in key plant locations. These displays show dollar-loss totals, feature the items most frequently scrapped.

GIMMICKS—Mr. Scrapman hands employees a big laugh—and lollipops, too—in drive for scrap awareness. Lollipops go to production workers who beat their monthly scrap bogey.

PRICE TAGS—and flashing lights. Display shows detailed cost of rejected parts. Flashing police-car beacon on top of stand picks up "No limit on scrap reduction" theme.

EMPLOYEE ART—Television tester Stanley Wypsick contributes artwork to the campaign. Emphasis on workman's share of profits contributed to retirement fund is important.

HOME-GROWN GAGS—Steve Kopera, material control foreman, lays wreath on grave. $71,900 figure for 1955 represents a 36% cut over 1954. Target for 1956: another 24% slash.

OVERSIZE POSTERS—Production Group Leader Shirley Crites points to parts damaged through waste in assembly of TV sets. Scrap Bug that devours profits is Shirley's creation.

Ideas Like These Six Will Help You Slash Your Scrap Loss

This year they'll add 24% to Motorola's 36% cut in 1955. Biggest helpers: smart workers.

PRODUCTION UP 39%. Scrap loss down 36%. That's the success story of the Motorola (Chicago) scrap campaign in 1955. This year, 1956, the outlook is even better.

What's the secret? It's simple, says Motorola. Like baking a good cake, you need the right ingredients. And what are the right ingredients for a scrap-reduction campaign with a payoff? They are top-level interest, concrete targets to shoot at, responsibility pinned on the foremen, frequent reporting, employee cooperation, and lots of ideas—like those in the photos on these and the next two pages.

Where do the ideas come from? From just about everywhere. A volunteer committee (see next page) acts as promotional headquarters. Then each foreman sparks the drive for ideas in his department. Because the most important ideas are those that come from Motorola's 3500 employees. Employees like to cooperate if they see their own ideas adopted and promoted—the old principle of participation. What's more, Motorola has a profit-sharing plan linked to its vested retirement fund, so employees can see a direct connection between their present efforts and their future.

Ideas shown in the photos are just a sampling. Motorola employees also came up with these attention-getters:

. . . *Safety pins* with attached tags that read, "Let's pin down scrap."

. . . *Animated TV display* showing effect of scrap loss on profit.

. . . *Giant scrap-bag booby prize* for the department with the worst scrap record.

. . . *Bogus check* drawn on profit-sharing account and made out to Mr. Scrapman.

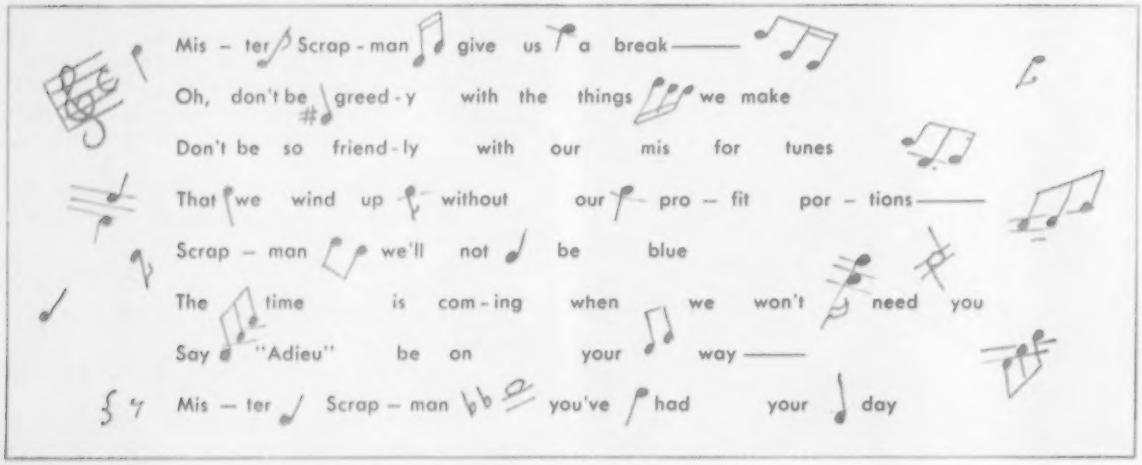
Now, for a blow-by-blow account of how Motorola runs its scrap-reduction program—

Turn the page

Begins on page 114

Behind employee-sparked promotion...

SINGING THE VICTORY SONG—Scrap committee celebrates meeting last year's bogey by belting out the prize-winning lyric to "Mr. Scrapman" tune. Lyricist Margaret Ludolph leads the quintet. She wrote winning words, is stockroom employee.


Mis – ter Scrap-man give us a break——
Oh, don't be greed-y with the things we make
Don't be so friend-ly with our mis for tunes
That we wind up without our pro – fit por – tions——
Scrap – man we'll not be blue
The time is com-ing when we won't need you
Say "Adieu" be on your way——
Mis – ter Scrap – man you've had your day

WINNING LYRIC—This is it. Motorola contest to write words for "Mr. Scrapman" brought many spirited entries. Music-savvy readers will recognize this for what it is —a parody on the popular song hit, "Mr. Sandman."

...management sets concrete goals to shoot at

SETTING THE BOGEY—Manufacturing Vice President Walter Scott (right) hands out 1956 bogeys. Projecting last year's records, he asks for a 24% cut over 1955. A volunteer Motorola committee runs the whole show.

Motorola's war on scrap begins right at the top. Working from the previous year's scrap-loss figures and production projected for the coming year, Walter B. Scott, vice president of manufacturing, sets a company-wide scrap bogey. This year for the Chicago plant it's a 24% reduction over 1955.

Scott presents this bogey in person to a scrap-reduction committee that the plant superintendent recruits. The superintendent translates the over-all bogey into a target figure for each department. This bogey is expressed in total dollars —and in unit costs as well.

For instance, if in 1955 a coil-winding group produced 1,000,000 units, and its total scrap cost amounted to $18,500, the average scrap cost was $.019 per unit. Now, aiming at a still further reduction of 24%, the group's 1956 bogey would be roughly $14,000—or an average scrap cost of $.014 per unit.

The plant superintendent is responsible for the success or failure of the program, but he assigns one of his associates (this year the night superintendent) to head the committee. Other committee members include a foreman from the stock department, two supervisors from the salvage department, and a foreman from the operating department. This last member is rotated each month in order to bring fresh ideas to the committee. He also must keep the displays and scrap bulletin boards up to date.

The committee meets with all department foremen at the start of the year to reveal the bogies and to present the promotion framework for the next 12 months.

Actual ideas for getting the campaign off the ground are up to each foreman. In this way they reflect his ability to secure participation from his employees. He has a month in which to poll his workers and gather ideas on how to promote departmental scrap awareness.

The fact that promotional doors are left open produces stunts and contests like the *Mr. Scrapman* song (see opposite page). Although the company's profit-sharing plan provides a certain amount of motivation, its effect is lessened by the fact that payments to employees occur only after their retirement.

Color selected ➘ ➚ color applied

COLOR CONFERENCE FOCUSES ON HAND-PAINTED PICTURE THAT SHOWS PROPOSED COLORS.

Now — Bright Colors for Exteriors

Coming for outdoor plants: more colors everywhere. They'll banish that drab look, cheer up your workers, give new sparkle to your whole neighborhood.

"MUST we stick to aluminum gray? Can't we use some other colors on the outside—the way we do inside?"

Those are the questions management men at Esso Bayway (N.J.) Refinery began asking themselves about two years ago. Since then they've made lots of decisions on color (photo above). Results? A new high in cheerful color.

Up to two years ago Bayway had always used the single-color treatment—an aluminum finish. This gave a good protective coating for a number of years. But it always took on a washed-out, vapid look within six months. So management took a look at successful use of color inside the plant, decided to give it a try on the outside.

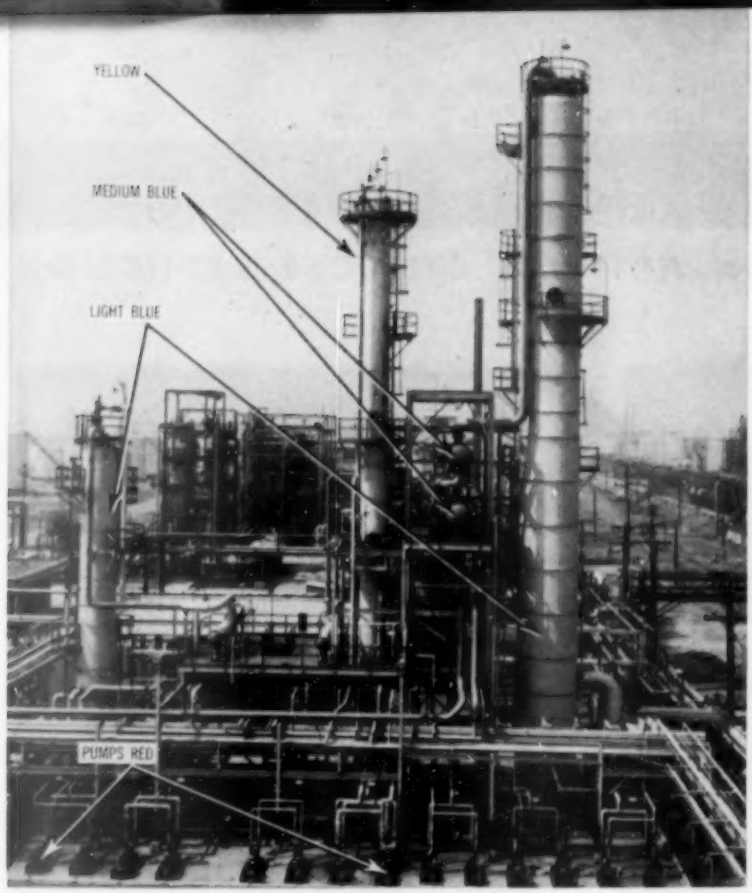
Payoff for color — A vast improvement in appearance makes the color project worth while—even if there were no other benefits. But the change from drab caterpillar gray to butterfly brightness has brought other favorable effects:

. . . *Morale is higher.* Attractive surroundings make the refinery cheerful and pleasant.

. . . *Housekeeping is better.* Employees are proud of the way their units look, keep everything clean and tidy.

. . . *Community and public relations are more pleasant.* In prettying itself up Bayway is losing the typical dull look of an outdoor process plant. Tourists from everywhere, traveling U. S. Route 1 and the New Jersey Turnpike, know Esso Bayway as "that refinery we saw so nicely painted."

Spreading color—First colored unit at Esso was completed toward the end of 1954. Now all new units and those up for repainting (a 5- to 6-year schedule) are treated in color. By 1960 Bayway's entire 1600 acres will sparkle and shine. But already enough units are completed (storage and processing tanks, columns, exchangers, plus hundreds of pumps and miles of pipeline) to guarantee a pleasing final result—no nightmare of color. The drab monotony of a single color is gone. A tour through Bayway's acres should convince any doubting Thomas that color is there to stay.



COLOR BLEND WITH NEARBY UNITS IS RESULT OF PLANNING.

PLANNING FOR COLOR

Don't get the idea this color project is a haphazard affair. A lot of planning is involved. Also, there's a careful preview before every choice of new colors when units come up for treatment. Esso wants no color-crazy monstrosity. Each new unit must have harmonizing elements—and must blend well with the rest of the plant. There's no room for a slip-up that ends in an "Ain't that gosh-awful?" reaction.

Soon after the start management stated it didn't want just any old color. And that it wanted to approve a standard group of hues and shades. Engineering proposed six major colors: blue, green, yellow, red, brown, and gray. Esso finally adopted 18 standards in all—three shades (light, medium, and dark) of green, brown, blue, and gray; four shades of red; two of yellow.

Esso has its own traditional library of colors, therefore doesn't use either API (American Petroleum Institute) or ASA (American Standards Association) color codes inside or outside. Safety valves and blow-down lines are painted a bright yellow that's used nowhere else. Pipelines usually follow the color scheme of the background. A few are identified by bands but most are stenciled at intervals with names of fluids carried. To be sure, Esso did start out by color-coding them. But it was too expensive to use all the different colors needed in the mass of parallel lines in process equipment. Stenciling serves the purpose just as well.

Among the shades of red is baby pink. Sound off-key for a rough and tough refinery? Well, that baby pink on a row of storage tanks in one corner of Bayway looks almost like an orchard of double-blossom cherry trees in full bloom. Another red shade is fire red—limited to fire equipment and accent trim (hand rails, for example).

Another off-beat color is white. It's used in the gasoline-blending tank field to cut evaporation losses. But it's dressed up by accent touches —such as a narrow red dado with a blue trim line for separation. Other types of tank have various colors: light green on cone roof and upper half and dark green on lower half; or light brown top and dark brown bottom; or solid baby pink and other colors.

Tests for paint—Esso purchases paints on a competitive basis. Vendors must match the standard colors. At Bayway Refinery and at Esso Research & Engineering Company laboratories new formulations are continually being investigated by accelerated Weatherometer tests. These tests are correlated with 45-deg. sun-panel tests at Bayway. Tests cover color retention, weathering, hiding power, and brushability. Bayway doesn't use sprays—sticks mostly to rollers, but also does some brushing on.

SELECTING COLORS

How does Esso keep these 18 colors from becoming the gaudy mess you sometimes see in other plants? By a procedure that guarantees color coordination. No color wheel, no other basic guide for complementary or compatible colors.

Follow the procedure through. Painting department gets an annual list of painting jobs due. List is revised monthly for priority.

First step is to ask paint suppliers for a proposed color picture (hand-painted) of the unit involved. Esso gives them an 18x24-in. enlargement of an 8x10-in. black-and-white photo to work with. Also color patterns of nearby units. Suppliers may use any of the 18 colors in making their proposal.

Next the group operating the unit makes its choice among the proposals, relays it to the department head. The successful vendor then submits a detailed color scheme that shows even the small items that don't show up in the hand-painted picture—such as pumps, exchangers, vessels, interiors of control rooms. From this color scheme Esso drafts complete written specifications that list each item and its color.

The program at Bayway Refinery has worked well in controlling color selection. Refinery personnel like the idea of working in surroundings whose colors they have helped select. And operators of units that haven't yet been given the color treatment—but are on the waiting list—are eager to get a color job done.

One man for two

Operation—Heating, then forging slugs.

Old way—Furnace was far from press. One man removed slugs from furnace, placed them in die. Another tripped press, released knockout, removed part, lubricated dies.

New way—Furnace is close to operator. Redesigned die provides automatic knockout. Parts are air-ejected. Switches are changed. Operator lubricates dies with nozzle in left hand, places hot slugs in die with right hand, trips press with foot switch. Parts are ejected to a chute. Output is doubled.

More production

Operation—Removing sand foundry cores from drier plates, then placing them in wood storage boxes for molding.

Old way—Packer picked up and held handful of cores in left hand, placed them (one at a time) in boxes with right hand. Boxes were flat on table, so packer had to stretch to see inside.

New way—Boxes are raised at back, tilted toward packer. Packer can see and reach inside. She now picks up handful of cores in each hand, uses both hands to pack.

Big Savings With Better Methods

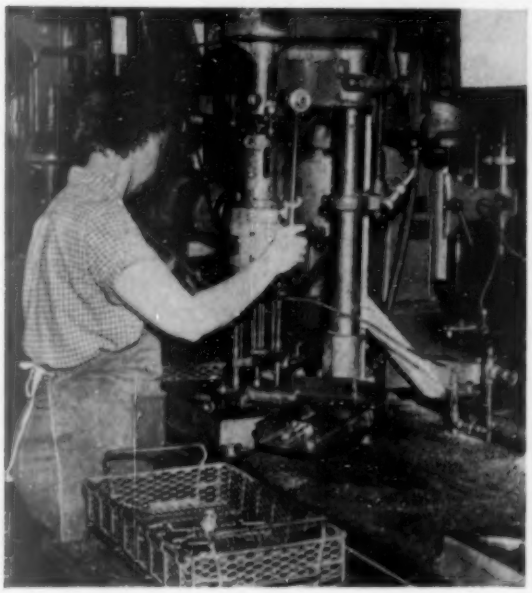
Sure to hit your plant soon: the coming cost squeeze. Here's how Mueller Brass is getting set—with a methods program that wrings $75,000 from better ways.

By ERNEST SCHLEUSENER
Formerly Vice President, Manufacturing, Mueller Brass Co., Port Huron, Mich., (now Vice President and Treasurer, Rodney Hunt Machine Co., Orange, Mass.)

METHODS engineering on top of work simplification and a money-saving suggestion plan? Sure. We pass up no opportunity here at Mueller Brass to improve manufacturing techniques—and cut costs. Methods engineering is one more string to our cost-cutting bow because it:

. . . *Saves us big money.* In 1955 it whacked about $75,000 off our

OUT OF THE EXPERIENCE OF MUELLER BRASS COMPANY

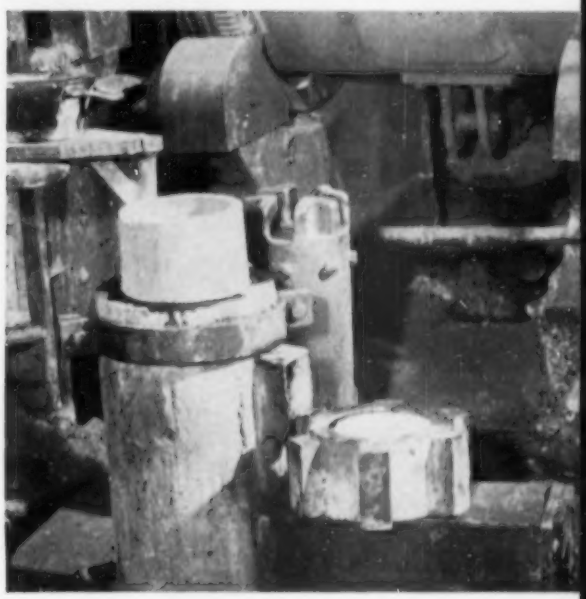


900 hours per year

Operation—Drilling parts.

Old way—Operator loaded part into fixture with left hand, clamped it with right. With right hand she drilled holes with multiple spindle, unclamped part, put it in basket.

New way—With automatic clamping and ejecting mechanisms, operator loads fixture with left hand, moves drill-press lever with right. Act of lowering spindle clamps part. Raising spindle automatically releases part. Air ejects part into chute. Part slides down chute to basket.



30 pounds per casting

Operation—Casting high-grade alloys.

Old way—Cast-iron hot tops allowed metal to cool too fast. That way, metal in top couldn't trickle down to fill voids during shrinkage. Top metal had to be sawed off, holes in casting were a cause of scrapped product.

New way—Steel holder with Feedex liner is used instead of cast-iron hot top. Liner ignites and burns when metal flows into mold, leaving a hard shell that keeps metal in top molten until shrinkage in rest of casting is complete.

costs. That's in addition to some $400,000 credited to work simplification and suggestions (FACTORY, October 1956, p. 134).

. . . *Gives our estimating department* quick figures on new jobs.

. . . *Speeds better information* to our planning department.

WHERE IT FITS

Methods engineering is one of several divisions of a far-reaching program that covers all approaches to better manufacturing—from a suggestion system to automation (look for an article on automation at Mueller Brass in December FACTORY). We have a special methods engineering department to guarantee we won't overlook any cost-cutting aids in that area. And our methods engineering program is set up to enlist all manufacturing personnel in methods improvement efforts.

Geared to work simplification—Some 50% of our methods engineering work comes from work simplification projects. When such a project is completed, the responsible supervisor or staff man turns it in for credit. But a work simplification improvement project can't be put to use until methods engineering completes a new method-specification sheet. Methods engineering records the details of all methods.

Geared to suggestions—Methods engineering receives and processes suggestions from employees, contacts supervisors and staff men concerned, and develops the idea into a new method—or to the point where it's clearly not workable. If a method improvement results from

Begins on page 120

"Record the new method and calculate the savings"

Two operations

Operation—Packaging and preparing valves for shipping.

Old way—Assembled valves were moved to a packaging area. There they were placed in cartons, labeled, packed in shipping containers.

New way—Operations are combined. Most valves are packaged in final assembly operation. Two operations are thus eliminated: (1) placing valves in container before moving them to packaging area and (2) moving valves to packaging area.

Fumbles and re-grasps

Operation—Assembling valves.

Old way—Assembler took a handful of each component, positioned one in each of 10 nests, returned left-over parts to respective bins. This way, one hand served only as an auxiliary bin. Fumbles slowed down her work.

New way—With a 2-nest fixture worker picks up only two of each component (one in each hand), thus assembles two valves at once. Far fewer fumbles and re-grasps. And no left-over parts to be returned to the bin.

a suggestion, methods engineering records the new method, calculates the savings. The company pays the employee a percentage of savings.

Ideas from within—Our methods engineering department generates a lot of ideas of its own. It develops these (plus ideas it picks up from sources other than work simplification and suggestions) for use in the plant. Our men use the standard methods improvement technique, which differs from our five-step work simplification procedure (FACTORY, October 1956, p. 134).

HOW IT WORKS

Our department has two chief activities: (1) to record the original (or best-known) method currently in the plant and get all shifts to use it; and (2) to improve methods through ideas, work simplification projects, and surveys.

Standardizing methods—First step in setting up our program was to record current practice. This showed we were not always using the best method on all similar equipment on all three shifts. To derive the best one, we studied all methods. We found, for instance, that one operator might have the best sequence in getting, feeding, and putting away parts; another, the best pre-positioning set-up; a third, the best check-and-put-away system. We combined the best techniques into a new method, recorded it, made it standard for all similar machines on all three shifts, and published it widely so every operator would know the company expected him to use the best method known. This way, we marked up substantial savings.

Here's where the foreman plays a significant part. As a front-line management man he must get all his people to use the established method. If he fails, cost reduction is likely to fall apart.

Our standard method charts were rather simple at first. But we have added laboratory technical information, quality control information, and details about trouble in previous runs of a product. Now, with complete standard method charts, our operators are better informed, can avoid costly mistakes.

Improving methods—When we haven't studied a method for several years, chances are it can be improved (and our costs cut) by a methods study. For example, we recently boosted output of a rod-mill heat-treating furnace 20% with a methods study. This furnace was a bottleneck in a methods survey study of the mill. We made a study of the furnace operation, got help from our laboratory, our departmental supervisors, and others. We found that the amount of material coming out of the furnace varied from hour to hour, that the number of blank spaces varied, and that the time needed to change furnace temperatures slowed down the furnace. With these findings and others we set up our new method.

Teaming up—Methods engineering works right along with the materials handling department (FACTORY, August 1956, p. 114). If production asks for it, materials handling will study all material-moving operations, including design of containers, scrap bins, storage racks, etc. And when methods engineering sets up an operation that involves the movement of materials, it calls in the materials-handling department for consultation.

Looking for problems—We range far and wide in our search for places where methods improvements will help. The places where we look include production bottlenecks, troublesome jobs, operations with lots of rejects and delinquent orders, jobs where workers can't produce above standard, jobs that involve a great deal of physical work, jobs on which the accident rate is high.

Making a methods study—This should start, we think, with a complete question interview with the supervisor and the operator on the job. Sample questions: Is work arriving in the best possible condition? Is it handy, well positioned, so operator uses minimum effort? Does operation sequence allow operator to preposition work, and put away finished work while machine is in operation? Can work be gaged or inspected without loss of machine time and with minimum effort? Is operator's position comfortable? Is light OK?

Answers probably will reveal problems in the operation. If they do, we find it best to ask operator and supervisor for their ideas for its improvement. Here as elsewhere any new method should grow from the combined thinking of all personnel. If it doesn't, natural resistance to change may succeed in blocking the new method.

Fact is, a second- or third-best method that grows from the cooperative effort of operator, supervisor, and methods man will sometimes bring better results than the very best method. What's more, you can sometimes put a second-best method to work right away and derive benefits at once, whereas you might have a hard time selling the very best method. Even the second-best way will save money if it's better than the current method. Finally, the very best way isn't always the most economical way.

HOW TO PUT IT OVER

Staffing methods engineering—When we started our department we staffed it with methods men from several production departments. They reported directly to production supervisors. Their background was varied. One had been a good setup man; another an all-round mechanic. A few had formal education—either in college or in a consultant's method engineering school.

But getting new men was a different problem. We wanted technically trained men. But they were in short supply. And we felt our technical departments (machine design and laboratory, for example) should have first call on those we could get. So we decided we'd have to train our own men. We now take men who pass a group of tests, then pick out the candidates with best aptitude for methods work.

Solving human-relations problems—Getting cooperation works two ways. We consult foremen and operators when we record current methods because they are good sources of methods improvements. On the other hand, when a foreman or operator turns in a suggestion we have a good opportunity to study the entire method. This way, foreman and operator feel they're in the act—and will help us set up a better method. Here's how we go about it:

. . . *Use the positive approach.* When our methods engineering men receive a suggestion from a production man they don't question its merits. They use the positive approach, study the job even if the idea isn't workable. If they do come up with a workable solution they consult with the production man until everybody agrees on an improved method.

. . . *Establish the need for a better method.* We don't tell people they should have new methods. We consult with them, gently lead them to the conclusion that a new method might improve the situation.

. . . *Offer a service.* Our engineers don't try to thrust their ideas on others. Fact is, our department isn't made up of experts. It exists to render a service—to help set up and record new methods. With that in mind, our methods engineering people talk and counsel with supervisors and operators, try to come up with a method that incorporates the best ideas from all concerned. They never *tell* anybody how to improve a method—even after the need has been established. If a superintendent or foreman knows he is losing orders because of high-cost methods, he may ask the methods department to look for improvement opportunities. The methods department will send a task force—representatives from materials handling and the laboratory plus a supervisor from another department—to make a survey. They'll show the foreman or superintendent what they find. This becomes a guide to the best opportunities for methods improvement. The improvement then becomes a task for methods engineering or a work simplification project.

. . . *Use modern aids.* In making operation surveys and methods-improvement studies we use such techniques as ratio-delay studies, movies of operations, continuous all-day timestudies, and others.

. . . *Keep informed.* Methods engineering, like all other production and service departments, makes a monthly progress report.

Show them in the afternoons

Tell them in the mornings

Two-Day Seminar

Makes Managers Hep on Automation

YES, THAT'S HOW International Harvester Company (Chicago) went all-out last month to update its technical and manufacturing engineers and managers on the latest automation techniques and tools. Object? To be certain that Harvester's manufacturing methods take advantage of the new technology just as intelligently and as quickly as possible. Results? Too soon to document. But if enthusiasm is a measure, Harvester people who attended came away crammed full of practical ideas for getting automation under way.

This familiarization seminar (labeled "Progress Through Automation") was conducted at Harvester's manufacturing research department. It lasted two days, was repeated seven times in September and October to include about 500 management and engineering people. In the morning, conferees listened to lectures by company experts, other authorities invited from universities, and manufacturers of automation equipment.

In the afternoon conferees visited the exhibition hall to see films and live demonstrations of automation in action. Featured were examples of automation already installed in Harvester plants—like the breaker-arm assembly machine—and over 50 other displays of standard model machines and tools available for automation. Commercially available equipment on display was loaned and demonstrated by equipment manufacturers.

Keynote of International Harvester's approach to automation was sounded by R. C. Archer, manufacturing vice president. Speaking of the various definitions of the term "automation," he said:

"I am sure that you will find it difficult to determine whether the processing employed is mechanization or automation. The differences are of little interest to the Harvester Company. We are interested in both if they provide us with lower costs, higher quality, greater safety, or improved working conditions."

Archer drew another helpful guide for manufacturing executives:

"We recognize that the degree to which automation techniques should be applied depends upon many factors such as production requirements and the stability of design . . . In some instances it may be of benefit to use simplified handling equipment or controls on a single machine. In other cases complete automation of a group of machines or even an entire line may be justified . . . Our greatest potential benefits may be obtained through the use of partial automation or the utilization of versatile handling equipment on a single operation or group of operations."

LECTURE PROGRAM FOR ORIENTATION

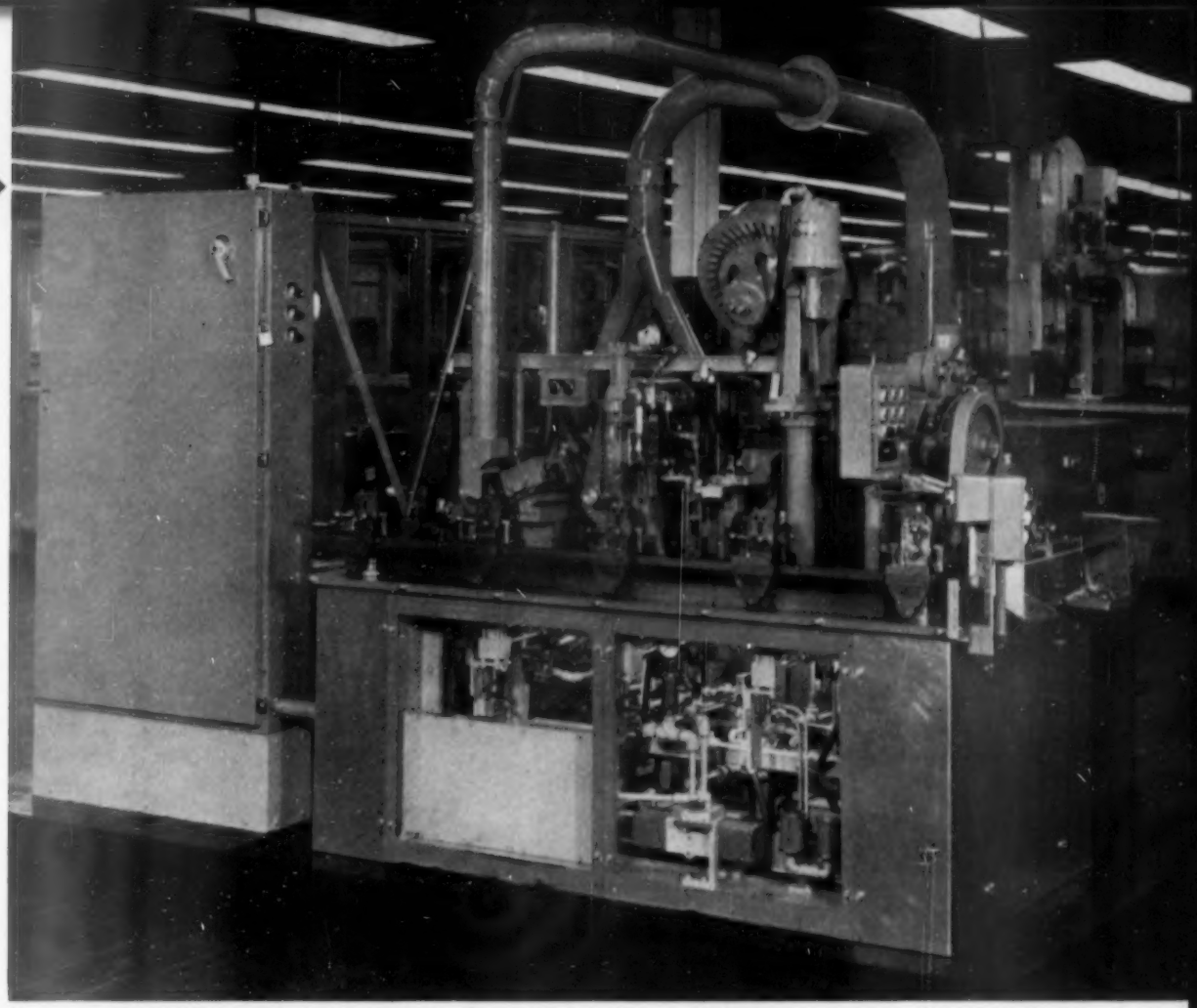
- Keynote Address by Vice President of Manufacturing
- A Good Look at Automation
- Mechanics of Automation
- Servo and Feed-Back Principles
- Automation—an Aid to Quality Control
- Movement of Materials
- Automation in Welding
- Foundry Automation
- Summation and Comments

FILMS TO SHOW HOW

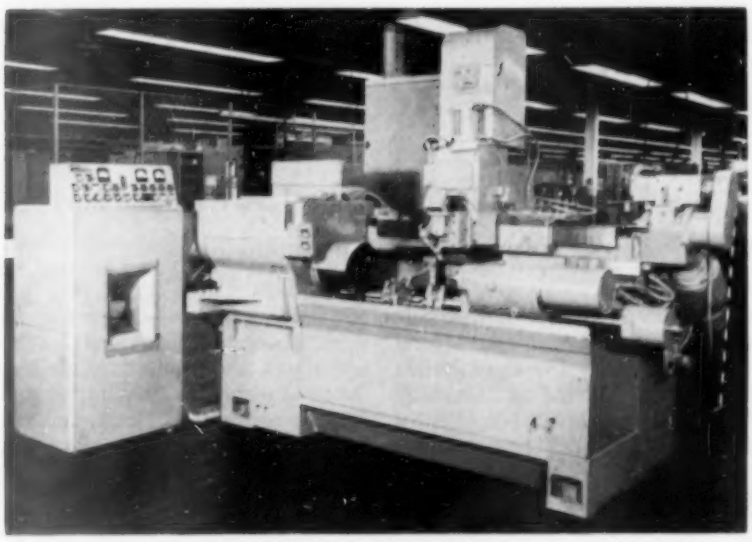
- Automation Developments at I-H
- Grinding Operations Automated
- Latest Developments in Automatic Loading Devices for Machine Tools
- Trends in Modern Forging

OTHER DEMONSTRATION HIGHLIGHTS

- Closed Circuit Television
- Automatic Power Sawing
- Automatic Raceway Grinding
- Continuous Broaching
- Automatic Loading Mechanism
- Electrical Machine Controls
- Automatic Labeling Machines
- Automatic Packing Machines
- Turning with Ceramic Tools
- Sintered Metal Part Fabrication
- Induction Heat Treating
- Progressive Assembly of Plow Bottoms



CUSTOM-MADE MACHINES IN USE. This machine assembles breaker arms automatically. Designed and built by Harvester's West Pullman Works, it uses only 2 operators to do job 5 machines and 5½ operators used to do. Cost $15,000 to build, but racks up annual savings of $9582. Other exhibits featured automatic welding and foundry installations.



STANDARD MACHINE MODELS AVAILABLE. Turning on this lathe is directed by punch cards inserted in automatic controlling device to left. Machine at right can gage and sort screw machine parts at rate of 3600 per hour. Both are standard models. Exhibits included over 50 new tools, equipment, and materials for automation loaned for show by manufacturers.

On big production machines...

...and small production equipment

It's Mounting Pads for Quick

Biggest plus: lower installation costs (as little as one-third the usual lag-bolt method). Other payoffs: less vibration, less noise, less floor maintenance.

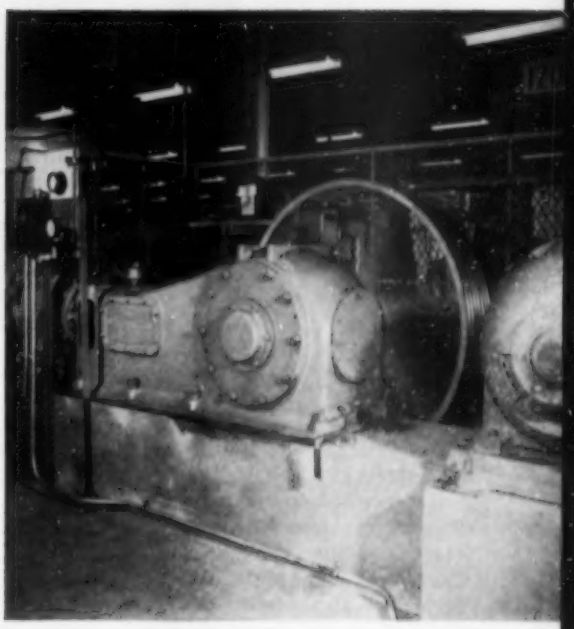
PUNCH PRESSES, kick presses, buffing jacks, dinking machines, compressors. They all pound. And Farrington Manufacturing Company (Needham, Mass.) has hundreds of them. From little 1-tonners up to husky 75-ton machines. Farrington makes fabric-covered metal cases for packaging and displaying products like watches, shavers, jewelry cases.

In its old plant, presses down on the second floor shook fifth-floor offices. Company engineers went all-out to correct this situation, experimented with several types of flexible mount, finally settled on "Unisorb" engineered mounts (The Felters Company, Boston).

They were so pleased with results that when they moved equipment into the company's new plant (in March of last year), they installed every production machine and all auxiliary service equipment—over 500 units of all sizes—on these non-rigid mounting pads. And found advantages that far outweigh the reduction-in-vibration benefits that got the ball rolling:

. . . *Cheaper installation.* Past experience indicated that it took at least one man-hour to install each lag used in bolting machines into place. That added up to a "hold-down" cost about three times the cost of the pre-cut pads in place.

On toolroom machines...



...and service equipment

Machine Moves

. . . *Faster installation.* Cementing felt mounts, setting them down, can be done minutes before machine is lowered into place. Even allowing time for the cement to set, Farrington found it could get a newly located machine into action faster than before.

. . . *Easier machine relayout.* "Some weeks," company officials say, "we move a dozen machines." In the old plant, that meant installing a new set of lags; or, because that was too much of a project, putting up with the existing layout. Now, a squirt of cement softener is enough to free a machine.

. . . *Less floor maintenance.* Plant Engineer Frank Cusumano says that "the floors in the old plant were riddled with holes." In the new plant, of course, there are no holes. And no evidence of floor deterioration under the severe press load.

Farrington also reports:

. . . *Less noise.* While the company has no "before-and-after" measurements, the sharp noise of the presses has been changed to a "dull thud" that's at least easier to live with.

. . . *No "walking."* Not a single one of Farrington's machines—and that includes big presses tipped up to 30 degrees for ease of operation—has walked since they were installed a year ago.

. . . *Machine maintenance* has not changed. The change-over from rigid to flexible mounting has in no way increased the cost.

. . . *Leveling machines* has been no problem. Farrington either uses shims under the pad, or—when a machine has leveling screws—mounts plates on top of the pads and levels with the screws. Either method "works fine."

Mount details—Farrington used 1-, ½-, and ¼-in. pads. The thickest ones are used on presses of more than 25-ton capacity. Presses of 15- to 25-ton capacity and non-impact machines are mounted on ½-in. pads; light kick presses and conveyors on ¼-in. pads.

FACTORY | HUMAN RELATIONS

By LESTER R. BITTEL, Industrial Management Editor, FACTORY

Red for Weight Watchers

Want to help dieting employees control their calories? Here's how Eastman Kodak Company, Rochester, does it: Cafeteria kitchen staff prepares meat dishes with or without gravy, combination platters with or without potatoes. Then the menu board is tagged with red clips to indicate the options.

A red tag to the left of the menu indicates the entire order is available without gravy (e.g., ham without raisin sauce). A red tag above a certain part of an item means that the tagged portion won't be served (e.g., with frankfurters and potato salad, potato salad won't be served.)

High Wages Deceptive

Workers who complain that today's high wages are offset by equally high living conditions have a strong point, according to a recent report from the National Industrial Conference Board (New York City). It claims that a married couple with two children who made $3000 in 1939 must now earn more than double that amount to maintain the same after-tax purchasing power.

A wage earner with three dependents paid only $30 in federal income and social security taxes in 1939, which left him $2970. To end up with the equivalent today, he would have to gross $6122 a year, since taxes would take away $669 and loss from depreciation of the dollar would be $2483.

If you'd like to make a comparison of salaries for a similar family in the plant executive field, here's what NICB has to say: *It takes an income of $10,583 now to match a $5000-a-year salary in 1939.*

The facts—and the taxes—certainly hurt. But workers and management shouldn't lose sight of the fact that these are the high costs of war—and peace, and security for old age.

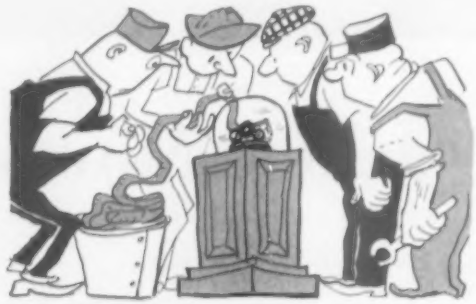
Athlete's Foot Must Go!

Sore feet are always a pain to industry. The toll that aching or infected feet take in absenteeism, fatigue, and morale is a big one. And athlete's foot plays a large part. If you think it's just a summertime malady, you're in for a surprise. A U. S. Public Health Service Report shows that, while incidence of this fungus rises to about 81% in summer, it still maintains an average of 46% in winter.

What to do about it? If workers take showers at your plant, you'll want to consider any one of a number of common methods of locker-room sanitation. These include anything from a foot trough of disinfectant, a sponge mat saturated with germ killer, paper slippers, sterilizing powders and lamps.

One intriguing new device called the Sani-Mister caught our eye. It works on a treadle principle. Worker leaving the shower "marks time" on it as it literally pumps a spray of disinfectant on his bare feet. It's said to be unusually effective.

But don't let your employees overlook the importance of personal hygiene. As with most dermatosis, cleanliness often is the most important factor in preventing athlete's foot.



Now the Investment Club

Latest employee club fad is the *investment club*. One such club is Franklin Associates, made up mostly of employees of Seiberling Rubber Company, Barberton, Ohio. Members put $10 per month into a pool for investment in common stocks. Benefits to club members are two-fold: (1) possible profits from dividends and stock appreciation, and (2) self-education in investment know-how.

As of now, the Security Exchange Commission has not frowned on this activity. But as self-protection, it might be one employee activity you'll want to divorce your company from—as Seiberling does.

New Cure for Absentees

One of the best uses we've heard profit-sharing put to is the control of absences. At one midwestern company employee bonuses are reduced in proportion to their attendance. For instance, if an employee misses 5 days out of a 250-day work year, his profit share is reduced by 1/50th.

One big drawback: this can lead to a sticky problem—identification of excused and unexcused absences and the decision to charge or not to charge the excused absences against profit-sharing bonuses.

What Communication Means

Are you like many plant operating men? Don't like the term "communication"? Think it's ambiguous, presumptuous? Well, the American Management Association, 1515 Broadway, N.Y. 36, has a new handle for it—*"action."* It has changed the name of its popular Executive Communication course to "Executive Action."

Here's AMA's reasoning: Communicating successfully involves many different skills and techniques. And it all adds up to the process of acting effectively as an executive.

High Fashion in Hard Hats

You're familiar with the distinctive headgear worn by printers, railroad engineers, chefs, and the like. Now workmen at Tidewater Oil Company's new plant at Wilmington, Del., color-mark their hard hats to distinguish their crafts.

Boilermakers wear dark blue; millwrights, pink with white stripes; concrete workers, white with black; safety engineers, yellow crossed with green. Options even include polka dots.

Marking is done by a warehouseman with pressure-sensitive tape on standard hard hats. Main idea is to provide quick identification for employees who work on the 450-acre lot. But as a group morale booster, too, the idea looks good. That is, if it doesn't act to over-aggravate the natural rivalry between work groups. The distinctive dress of the U. S. Marines, for instance, builds terrific *esprit de corps* within the unit. But it often provokes existing antagonism between the Marines and the Navy.

How to Handle Reservists

Military reservists in your plant a problem? Like to know how other companies are dealing with reservists' time off and pay? Then read on. The American Management Association, New York City, furnishes the following information gleaned from a survey of 132 companies with these problems:

In only 50 reporting companies does the reservist receive any company compensation during his annual reserve training leave. In the other 82 companies the reservist either gets no pay, or takes his leave during his regular vacation period.

In those companies that do compensate, the most popular method is to make up the difference between reserve and company pay—up to two weeks in most cases. Some 18 companies, however, report that they pay up to 17 days—which is the ordinary maximum time for the training period.

Plants that must handle second-shift problems that arise when reservists attend training sessions weekday evenings are generally less lenient. Only three companies pay the employee while he is absent for such training. Forty-five companies have transferred or are trying to transfer reservists to the day or third shift to avoid the problem.

One company with seven-day operations permits the employee to schedule one of his nights off on an evening when he must drill. Another company reports that the local National Guard unit is giving make-up drills during daylight hours for men working on the second shift.

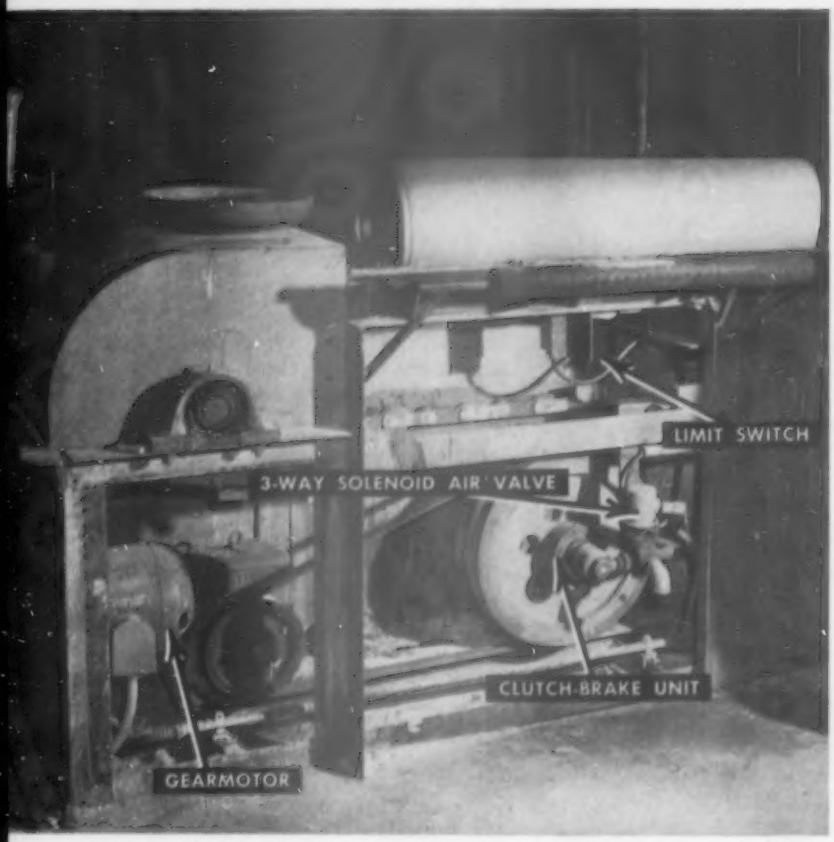
Digging Deep for Engineers

Pre-university recruiting for engineers! That's the latest method used by a West Coast firm to relieve the shortage of technically trained people.

The Narmco Manufacturing Company, La Mesa, Calif., offers 13 selected honor graduates (mathematics and physics majors) from San Diego High School this program: Summer employment at $1.50 per hour minimum. Loans of $200 per year to finance college education through the Ph.D. level. Cancellation of all obligations if the student works for Narmco for one year after graduation.

Cost of recruiting a B. S. graduate under this system would come to about $800. And that's not far from the figure quoted by many companies that use more common procedures.

Cost less to maintain...



CLUTCH-BRAKE WORKS INTERMITTENTLY AT THIS TRANSFER STATION

. . . OR ON SPLIT-SECOND CYCLE

New Drive ▲ Will Stop Conveyors ▲

Here's a power drive combination that stands the gaff of instantaneous starting and stopping of a heavy conveyor feed line—in split-minute cycles.

HUNDREDS of conveyor starts and stops a day at A. O. Smith's Kankakee plant. And they have to be on the dot. That's tough service for any conveyor power drive.

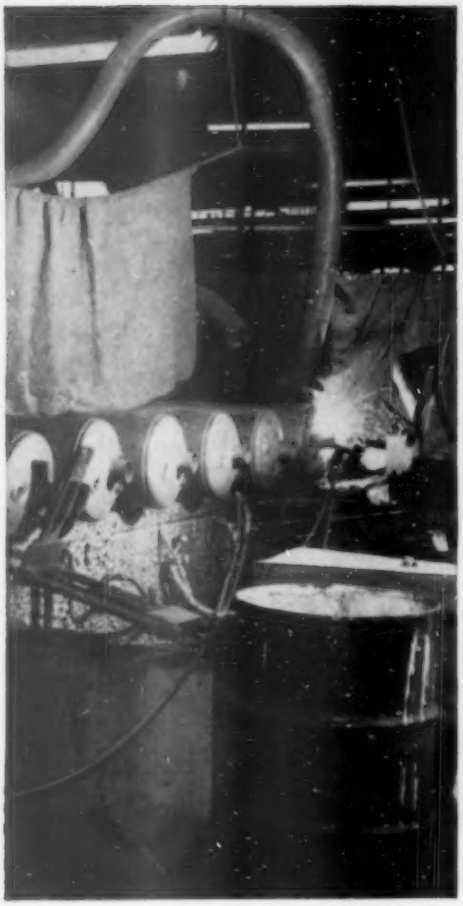
Up until two years ago our power drives were always giving us trouble. Even a few minutes of conveyor downtime was costly. And maintenance costs ran a bit high.

By HAROLD GILBERT
Supervisor of Plant Engineering
A. O. Smith Corp. Kankakee, Ill.

But now a new design, using an air-controlled clutch-brake as key component of the power drive, has put us on Easy Street. We have already installed eight new drives that cost no more to operate and much less to maintain. As for conveyor stoppages caused by power-drive failure, or indexing trouble, they just don't happen any more. Performance has been so good we will equip all conveyors requiring intermittent starting and stopping the same way.

Problem—In this plant hot-water heaters are produced in one highly integrated and mechanized continuous operation. Water heater shells, for example, are transported, transferred, and positioned by conveyors of varying lengths and types. There are two main classes of conveyor start-and-stop movements:

. . . *Some conveyors must index automatically.* Example: a conveyor servicing a welding operation with a 30-second welding cycle. This means a move not only twice a min-



IN WELDING OPERATION ABOVE.

On a Dime

ute, but on a split-second basis.

. . . Other conveyors move intermittently with no set time cycle. Example: conveyor bringing shells to transfer station. But it must stop with part in the right position, start when transfer has passed preceding part to next operation.

Old way—Conveyor drive shaft was direct-connected to a V-belt motor drive with an intermediate speed reducer. A mechanical-electrical limit switch wired into the motor control circuit actuated the starts and stops of the motor.

Degree of control was not satisfactory. There was over-riding and under-riding of conveyor movement. Moreover, when the conveyor was fully loaded it required a high starting torque. Thus it became necessary to use an oversize motor to prevent overheating of the motor and to stabilize operations.

New way — An air-controlled clutch-brake is mounted on the conveyor drive shaft. Clutch flywheel is connected by a V-belt drive to electric motor (photo at left). Clutch-brake is a standard punch press product made by Minster Machine Company (Minster, Ohio). Other clutches of the same air-controlled type (such as Dodge) can be used.

Chief purpose of the clutch is to eliminate motor starts and stops. Motor now runs continuously. Clutch and brake (all one unit) control rotation of the drive shaft. Clutch and brake are actuated by air pressure through a three-way solenoid valve. Valve is controlled by a limit switch on the conveyor line. Air pressure is obtained at 50 psi. by direct connection through a pressure regulator to the plant's central compressed-air system.

Now let's see what happens when a heater shell on a conveyor approaches a transfer point. When it reaches the exact point, it trips a mechanical-electrical limit switch. This throws the three-way solenoid air valve to the "off" position. Release of air pressure now causes clutch to disengage, brakes to apply simultaneously. Conveyor drive-shaft stops within a split-second. But clutch flywheel continues to rotate all the while in the same way a punch-press flywheel does after completion of a stroke.

When the heater shell is mechanically pushed off conveyor onto transfer device, the limit switch is released. This throws the solenoid air valve to "on," and restores air pressure that releases brake, re-engages clutch. Cycle of the conveyor movement is thus resumed. Should air pressure fail, brake applies automatically, stops conveyor.

Why we chose this type of drive

Mechanical reasons—Clutch and brake are in one compact unit, easy to mount and service. Unit will operate—engage or disengage—at any speed. It delivers a constant torque at a given air pressure regardless of brake travel or friction losses. Torque can be set to meet load conditions. Cushioned engagement reduces start-up shock and noise. There's no backlash to cause added wear or tear on parts. No overlap or drag because clutch-brake action is synchronized.

Low maintenance — Replaceable friction blocks are the only wearing surface. Adjustment for wear is easily made by a single adjusting nut. If necessary, the drive can be jogged, reversed, stopped anywhere in the cycle.

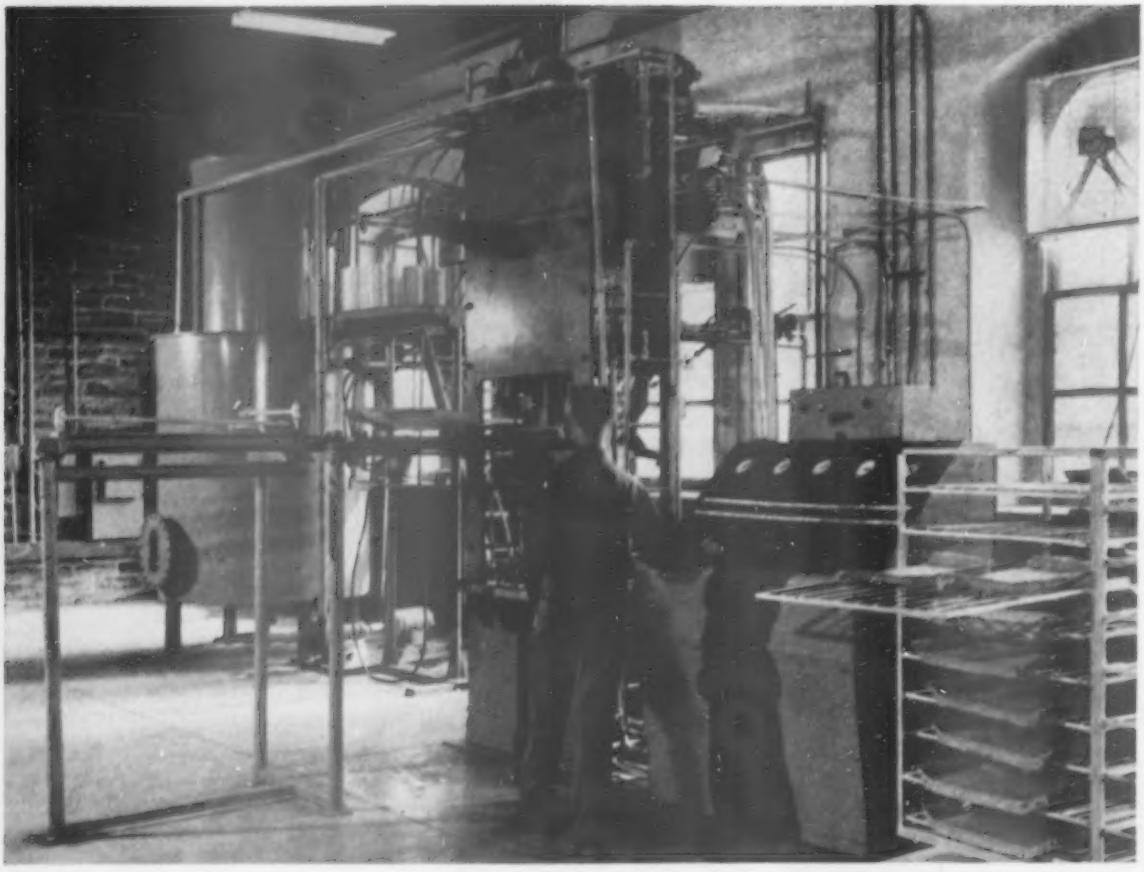
Plant operating reasons — This new drive brings the load to full speed in about one-fifth the time of our old set-up. Motor draws only about one-fourth the power during the acceleration period as compared with the old way. This permits use of a smaller motor—about 40% lower in hp. rating. Also, smaller motor doesn't overheat, because frequent starts and stops (up to twice a minute) are eliminated. For the same reason, electrical line load fluctuations are small.

How about the costs? Although new set-up costs more installed than old way, operating costs are about the same, maintenance costs much lower. Here are the facts:

. . . Installed cost. 3-hp. gearmotor and V-belt drive, $574; clutch-brake unit, $650; total, $1224. (Cost the old way: 5-hp. gearmotor and V-belt drive, $706; brake $293; additional jack-shaft, $150; total, $1149.)

. . . Operating cost. Power used is about the same. Continuously running 3-hp. motor has same energy drain as 5-hp. motor running on intermittent basis. But elimination of starting power surge helps smooth peak electrical load.

. . . Maintenance cost. The old direct-coupled set-up required attention on the average of once a week. The new clutch-brake set-up hasn't needed maintenance in the two years since it was first installed. This becomes important in freedom from downtime and production losses whenever the plant has to operate on a 24-hour-per-day basis.



Slurry of glass fibers and binder are molded ▲ into . . .

Breakthrough in Reinforced Plastics

Pressurform—new process for an industry long plagued by too much handwork—makes many new applications and designs possible. A worth-watching development.

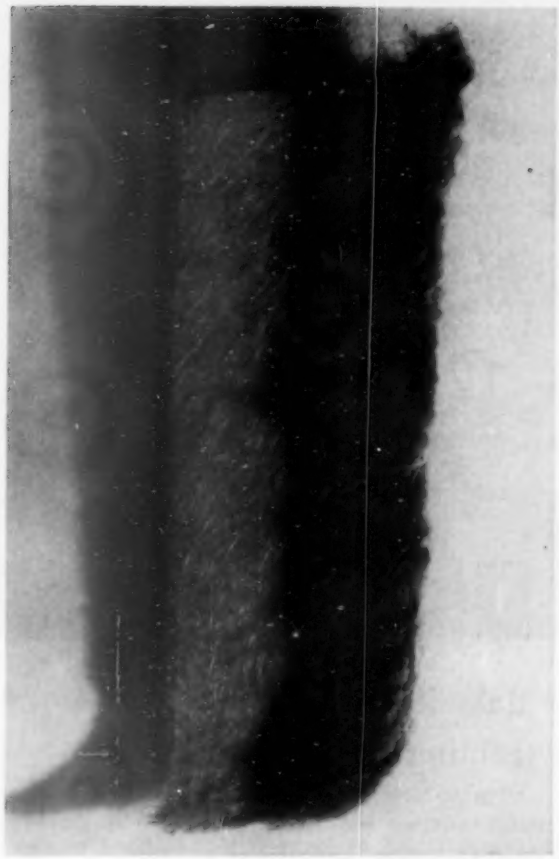
IT HAS ALWAYS been easy to make reinforced-plastic flat and corrugated panels—even contoured shapes—as long as the section thickness of the piece was constant. But making contoured parts with varying wall thickness—like the containers above being fabricated for General Electric—was a time-consuming and costly process. Glass matts had to be cut and tailored, contoured and shaped (using resin as a binder) to achieve outlines close to the final desired form—a "preform" as the trade calls it.

This difficult hand-tailoring—necessary before such parts could be molded with resin and heat-cured between matched metal dies—has held back development in the field. In addition to cost problems, quality control has been difficult, and good housekeeping impossible.

But this month the Pressurform Company of New York (principal headquarters, Swarthmore, Pa.) has announced a process that promises easy fabrication of almost any shape —any reasonable contour and variation in section thickness. The key development: a process for accurately molding preforms—by metering a watery mixture of glass fibers and binder into a preform mold that squeezes out the water, produces a damp, but firm, accurately formed preform ready for the molding press—all automatically.

Advantages—By replacing hand lay-up with this automatic process, Pressurform offers:

. . . Mass production techniques. It's easy to set up a continuous flow line to produce parts. Handling the slurry is a simple bulk-handling proposition; and it's easy to set up a mechanical system to feed parts out of the preform mold into the final



a damp, but firm, preform ◆ ...which is then molded ◆

mold, and out of it to any further operations.

. . . *Much lower costs.* Early indications are that—on a mass production basis—Pressurform-produced parts can be made for only half what they'd cost using present methods. Of course, tooling up is required. A typical Pressurform installation for producing preforms would cost approximately $100,000. But, with any volume, that cost should be quickly absorbable.

. . . *Wide new product possibilities.* Ability to obtain variable section thicknesses opens the door for designers to produce many new reinforced-plastic products. And enables them to design products better, putting strength (e.g., through ribbing), where needed, thinning down sections where possible. Further, the mix can be varied to supply different ratios of glass to binder, tailoring physical properties to specific produce and end use.

. . . *Better quality control.* Proportions and volume of material are controlled automatically. For one of the preforms now in production, variation is less than ½ ounce in 20 ounces. This is a big problem under hand lay-up methods.

. . . *Cleanliness.* The new system ends messy glass and sticky resin on plant floors.

How it works—Preform making starts with pulp preparation. Dispersion of binder in water is done at tank at left in photo above. Slurry flows to metering chamber above the preform press, where glass fibers are added. (Fibers are automatically chopped into preselected lengths—which can be varied between ¼ and ¾ inch, depending on structural properties desired.)

When the preform mold opens and previously produced preform is conveyed away, the metering device introduces the exact quantity of slurry for the next preform. The mold closes to squeeze out the water and press the remaining mixture into a consistent-density preform of the desired shape. Preforming pressures vary from 30 to 100 psi. Process takes less than a minute for the container preform shown, but varies slightly with size of the preform.

Removed from the press, damp preforms are oven-dried, then molded (as with hand laid-up preforms) in a matched metal press.

While Pressurform Container Corporation—a licensee—is producing products on a pilot-plant basis at its plant in Swarthmore, Pa., the company does not intend to expand production. Research and development will continue under process-developer S. H. A. Young, but further production will be by other companies on a royalty basis. First licensee, Banner Fiberglass Products Corporation, Patterson, N. J., expects to be in production by Jan. 1, 1957.)

Whether you budget big dollars or none at all, training still costs money —more than you think. So here are nine new tips from an old pro at training. They'll put more stretch in your training dollar, give you a program worth more than it costs.

1

Nine Ways to Stretch Your Training Dollar

HOW MUCH does your plant spend each year on training? $10,000? $100,000? Nothing? Whatever your figure, don't kid yourself. Compared to total money that goes down the training drain, it's a drop in the bucket. How come? Because training goes on all the time—whatever you call it, however you charge it.

Whenever a foreman corrects a worker, whenever you introduce a new machine or process or call a meeting—training is going on. It's costly. It bites into a manager's time and effort, ties up machines, jacks up labor costs. Figured this way, industry's bill for training runs into billions of dollars per year.

A wisely conceived program, properly run, will pare down this outlay—and can return your dollars 10 to 1. But that seldom means staff-cutting or budget-paring, which can be fatal to a program. Best program is the one that stretches the available dollars, makes the most of every training opportunity.

Let's start at the beginning, take a fresh look at training. With the nine dollar-stretchers that follow, we may shed old methods that cost too much.

By EUGENE C. PECKHAM
Western Training Services, Burlingame, Calif.

Make it clear that training aims for change

The more change you want, the more training you must provide. But don't expect the word *training* to work magic. A meeting that's called a training meeting may not train at all. And a series of meetings you call training courses may waste lots of time.

In fact, some companies have to set up training activities under other labels because their people have learned in the past that a so-called training course really means being bored or preached at or—at best—being merely entertained.

Training is really training only when a sought-for change takes place in the trainee. Unless something happens that makes the participant think, feel, or act differently, there just isn't any training.

What to do in your plant—Throughout your organization sell the idea that training is change. Try to make your people impatient with teaching attempts that don't get results. In your plant paper, training announcements, bulletin-board notices, and oral discussions, make a strong bond between the concepts of training and desirable change.

Let it be known that your company sets up training courses to change people. Urge people to come to your training meetings to learn something new. Convince them that training just isn't successful unless it helps them to change for the better—to do better work, to be safer, to turn out more production, to be more efficient, to learn new processes.

What not to do—Don't let anybody sell you courses for entertainment, securing awards, improving personnel records—or anything else that's off the beam. Be careful not to be-fog the issue. Make it crystal clear that training and desirable change are one and the same thing.

Pick the methods that get results

A person has changed from what he was before when he knows more, or thinks differently, or works better. Good training produces such results. Examples of procedures in good training:

. . . *Find out what trainees think should be taught.*

. . . *Let people act (as far as possible) the way they do on the job.* That is, use realistic job assignments, role-playing, demonstrations by trainees, the incident process, permissive discussion of cases, and skits.

. . . *Assign readings or projects* after trainees recognize the need for them.

. . . *Ask trainees to share the cost.* That way, they'll expect more—and get more. (You can pay your share through refunds paid on completion of training.)

What to do—Insist that everybody who trains anybody (including those who supervise) learn to use better training methods. Skilled advice will save you money. If you've got a skilled training man, make him a consultant—*not a director.* After all, his business is to help others handle all training possibilities—to be a trainer of trainers. He should help create situations in which training *must* take place.

Your man should know the best ways to communicate information. He should understand what makes people change opinions, attitudes. Most important, he should be a master in helping supervisors set up situations for people to acquire new skills.

What not to do—Don't rely exclusively on communication of information. Lectures, reading, and even movies have only limited power to change people significantly. Suspect any program that's light on learning-by-doing. Organized experience is far more effective than organized information.

Make your people want to learn

People react differently to training. Some eat out of your hand. Others you have to work on. Still others learn willingly only when they teach themselves. One thing common to all three groups: They learn only when *they* want to. So what you try for is maximum acceptance and minimum resistance.

What to do—Try these rules:

. . . *Make yourself personally acquainted* and friendly with every trainee before and during training. Sustain your contacts. Keep them informal.

. . . *Set a good example,* especially when human relations is the field of study. But a good example is also necessary in manual and technical fields.

. . . *Try to get everybody to contribute equally.* At the start of group training some people will talk too much; others, not at all. Soon, though, everybody should feel free to put in his nickel's worth.

. . . *Give the trainee a chance at enjoyment* as well as work. Training needn't be grim or uninspired. In ideal training, learning should absorb the trainee—should not seem to be work. "All work and no play makes Jack a dull boy" is true in training, too.

. . . *Invite full participation.* A trainee's learning will be proportional to his participation in the program—teaching, making decisions about the curriculum, helping with the physical arrangements, carrying out assignments, etc.

What not to do—Forcing techniques—those that attempt to *make* a person accept training—are poor. They increase the resistance factor. And they can lower the acceptance factor to almost zero. Strong-arming, nagging, exhortation, shaming, promising, and similar approaches are worse than none at all.

Turn the page

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See that training is put to use

A trainee's boss can sabotage a training program. Suppose, for instance, a trainee returns to his job and discovers his boss won't listen to anything about the "new ways." Instead, the boss scorns them, tells the trainee to "get back to work and forget those crazy ideas." With a boss like that it doesn't make much difference what you (the manager) want, what your trainees want, or what the trainers want. The only thing that counts is what the boss wants.

What to do—If the supervisor himself is handling the training, you needn't worry about this point. But if for some reason it's more economical or convenient to set up a centralized group-training program under a qualified person, then you've got to get the cooperation of your foremen. Here are some suggestions that may help:

. . . *Seek the supervisor's advice* about the skills his people need. Try forming a supervisor's committee to work with the trainer.

. . . *Hold periodic meetings* with supervisors to evaluate training results, select new directions for training, and solicit suggestions.

. . . *Submit regular oral and written reports* to the trainees' supervisors during the course.

What not to do—Don't overlook the boss of your trainee. Training programs that the boss himself doesn't run can accomplish very little unless you give every possible consideration to developing his acceptance of the program—and lowering his resistance to it. In an ideal training program, not a single decision in connection with your training program should be made without the full knowledge and concurrence of the supervisors under whom your trainees perform their regular work.

Win the backing of your trainees' pals

The people who work with your trainee—his friends and associates, that is—must approve of what is happening in the training program. What will make them approve of it? Several things. Maybe they feel they themselves will benefit by the gains of the trainee. Or maybe they'd like to see the trainee gain benefits for himself. But whatever their reasons may be, the trainee's associates should want the training to take place. What's more, they should know about it before it starts, encourage it while it's going on, and show interest in its results.

What to do—To win the approval of your trainee's pals, try these two approaches:

. . . *Devote as much attention* in your preliminary announcements to gaining the good will of the people who work with the trainee as you devote to the group being trained. If possible, get their suggestions for subject matter.

. . . *Train two or more people* from the same work location at the same time. This way, each member of the team will become a co-trainer, and each can help the other apply what he learns. Also, you'll whittle down the resistance factor, because each can express his "beefs" to the other and thus gain emotional release. When they return to the job the two together can make a stronger sales approach (for new ideas, data, skills) than one man alone.

What not to do—Don't treat trainees as crown princes or imply that training will give them advantage over their associates. If you let anything appear to favor trainees over those not being trained, you'll create resistance from those outside the program in addition to what you can normally expect from those who are included in the program.

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Get support of the trainee's family

Take advantage of the influence family and wife have on an individual. You'll do better if you get full cooperation from wife, children, and relatives. When the folks at home follow the progress of a training program favorably, acceptance by the trainee gets a real boost. That way, you begin to save dollars on your training program.

What to do—Let the folks at home know about the program in advance, so that they, too, will be aware of what's ahead. In communicating with families, let them know the advantages the participants will enjoy if they are successful. And you can also point out how families will benefit if Papa does well in his training course.

For instance, here's how the Ozalid Division plant (Johnson City, N.Y.) of General Analine Film Corporation gets supervisors' wives interested in their husband's training: Once a year Ozalid invites foremen's wives to a training session with their husbands. Wives participate on an equal footing, learn at firsthand how training will help the men—make their jobs easier, clear the way for advancement, make them more agreeable persons to live with.

Some companies also mail commercial newsletters (especially directed at wives of factory foremen) to supervisors' wives. If not commercial newsletters, then some similar publication pertinent to their husbands' training but of special interest to women.

What not to do—Don't imply that father needs training because his skills are below par, or that training is an unfavorable reflection on his job interest and attitude. You want his family to help you win his acceptance of training—not to reinforce his lack of enthusiasm.

Measure results stage by stage

You'll need "fixes" on your training group before, during, and after training. They should be objective, factual, simple, straightforward.

What to do—Get evaluation figures before training, from time to time while it's going on, and at the end. Also at intervals thereafter to see whether results are permanent. Pure objectivity is essential in any area where factors are measurable—wherever you expect training to cut cost, scrap, or accidents or to boost production or profits. But where results aren't precisely measurable (human relations, supervisory skills, for example) the "anecdotal" method works better. You take your "fixes" on each trainee from somebody who knows him—his knowledge, attitudes, skills. Periodic comparisons will show whether he's making improvements.

What not to do—Don't accept wishy-washy excuses from your trainers on why measurements aren't available. Depend on third parties—not on the training team—for reliable opinions and evaluations.

Don't be upset by griping. A gripe is a signal that the program is having effect—that it's challenging people to change. Fact is, the resistance factor in an individual is roughly proportional to his emotional reaction against training. If resistance is used as an evaluation it should be considered favorable—as evidence the training is taking hold.

Don't evaluate trainers by their methods. "Organized experience" methods are usually superior to "organized information" techniques. Yet some top men compel trainers to lecture, assign reading, use movies. Best rule: Hire the most skillful trainer you can get, give him his head, judge him by results.

Turn the page

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Check the need for refresher training

The courses that can train a person permanently are few and far between. To get lasting results you'll have to set up extended repetition and follow-up after the course is over. And to know when repetition and follow-up are needed, you'll need periodic checks on trainees who have completed the course.

You can appoint "watchdogs" who'll serve you well. These are the men in your plant who have an ingrained interest in training. Their natural inclinations and their job assignment make it easy for them to keep a sharp eye on the men who finish courses, to see whether they keep on applying the lessons they learned under training.

What to do—Size up the men around you. Spot the one or two who have had great success in training their own subordinates. How do you spot these men? By the growth and development of the people they supervise. And by the outstanding quality of their human relations, their high skill in leadership, and their ability to communicate ideas and attitudes. At the end of a training cycle ask these men to observe training results for a period of three to six months or more. Ask them for regular reports, preferably weekly reports. Maintain this regular evaluation on a going basis until you can be sure the training is permanent.

What not to do—Don't be a stop-and-go, blow-hot-blow-cold enthusiast about training your people. Accept the fact that training is a continuous, progressive process aimed at improvements for them—and for your company. If you don't persist in making sure trainees practise what they're taught, you can be sure they'll go back to their old ways of thinking, feeling, and acting.

Make training a permanent management job

You'll be really stretching your training dollars when training becomes one of the jobs a manager carries on regularly in his daily work. But when any number of leaders in an organization begin to believe training should be handed over to a special department—or to some one person who will be called a training director or some similar title that's equally wide of the methods and goals of real training—you're in line to waste a good many dollars.

What to do—In all your contacts (staff meetings, personal discussions, and written communications) make it clear to your associates and superiors that you expect them to learn the fine points of training. Each one of them should take over every possible training function within the limits of his ability and responsibility.

Abolish the concept of "direction" of training by staff members. Replace it with assistance that helps and coaches every member of management to do his own training. Members of the "training" department should train only members of management—and only in the skills they need to be trainers.

What not to do—Don't talk down training. And don't dodge your own responsibilities in training. As for your supervisors, don't keep them so busy getting out the goods on your production line that they can't find time to devote to their responsibilities in training. And don't think you'll stretch your training dollar by overworking your training staff, slashing away at the training budget, or increasing the number of participants in your training program. The only sound way to stretch it is to concentrate on improving your methods for the training that's done every day—formally and informally.

New layout and conveyor system make...

Shipping Faster and Cheaper

With a conveyorized layout that brings small-parts packages past Dorothy's window, EC&M lops 50% off shipping-labor costs—and serves customers faster.

THROUGH THE HOLE in the wall in the photo above you see Dorothy Colley at her desk. She's performing the "office" function connected with shipping renewal parts here at Electric Controller & Manufacturing Company, Division of Square D Company (Cleveland). The neat trick: Dorothy doesn't leave her desk to do her work. The work comes to Dorothy. Our layout (see photo) shows how it's done.

Clever as this aid to the office force is, it's overshadowed by shop savings and gains elsewhere:

. . . *A 50% labor saving.* We used to need four men (two wrappers, two packers). Now we need only one wrapper, one packer.

. . . *Efficient office operation.*

. . . *Improved service to customers* —by speeding shipment of parts.

By C. M. BEDNAR
Plant Industrial Engineer
Electric Controller & Mfg. Company
Division of Square D Company, Cleveland

Basic functions in the shipping job are: (1) wrap parts to protect them against damage, rust, contamination; (2) pack parts in cartons or similar containers; and (3) route, zone, check against master order and compute and apply postage or prepare bills of lading. This last job (3) is what Dorothy does.

Old way—It was standard for most similar operations. Our wrappers and packers worked from tables. Parts were stored near by, carried to wrapping table, wrapped, pushed on to packing table, packed, carried to storage for shipping. At intervals one of the men would take the paperwork to the office for routing, etc. Four men did the job—and a part-time girl handled the paperwork. Costs for the operation were high—this was obvious without elaborate study.

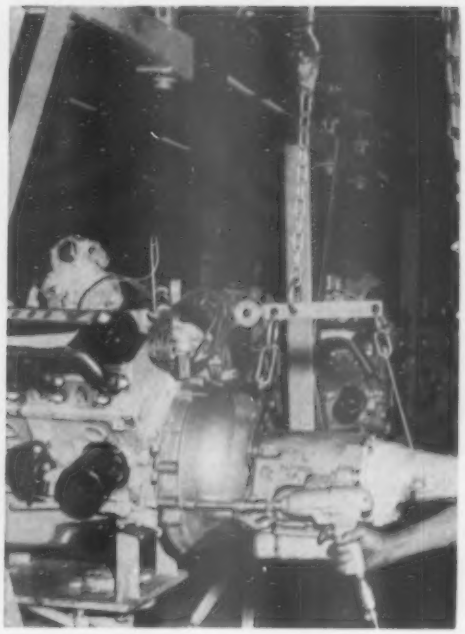
We also found a situation that's often overlooked — worker complaints. The men had been griping about fatigue. Too much lifting, shoving, pulling, and tugging, they claimed. They were quite right. They spent over half of their productive effort in just moving the product around in the workplace.

New way—To improve the workplace layout and also reduce the handling problem we designed the conveyor system as shown in the photo. Here we went a step beyond the usual—we relocated the operation so the work would pass the shipping office. This way, running back and forth with paperwork is eliminated and paperwork stays with the parts, reducing mix-ups.

Here's how our system works: Fork trucks bring parts to conveyor in pans. Parts are placed on conveyor rather than floor. Next stop: wrapper. Then on to packer. Packer puts parts in box, then weighs container on scale (part of conveyor) before sending box on to Dorothy in shipping office. She routes, checks, etc., and sends package on its way to freight or parcel-post leg.

Bolting—with safety and torque control . . .

Job 1. Engine mount to auto body . . .



Job 2. Transmission

New Wrench Licks 3 Slow Jobs

Any problems with your air-powered torque wrenches? Here's how Ford achieved safety and torque control with a new Ingersoll-Rand tool that may help you, too.

IN ITS HUGE, Mahwah, N. J., assembly plant, Ford Motor Company uses lots of air-powered torque wrenches for nut running. With stall-type tools, some operations were troublesome. But recently Ford has been trying a new wrench (photos above) that uses the torsion-bar principle. Ingersoll-Rand's Torque Control Impactool has:

. . . *Eliminated a safety hazard.*

. . . *Achieved torque control* where it was not possible before.

. . . *Reduced need for checking torque* with hand wrenches.

GOOD FOR THREE JOBS

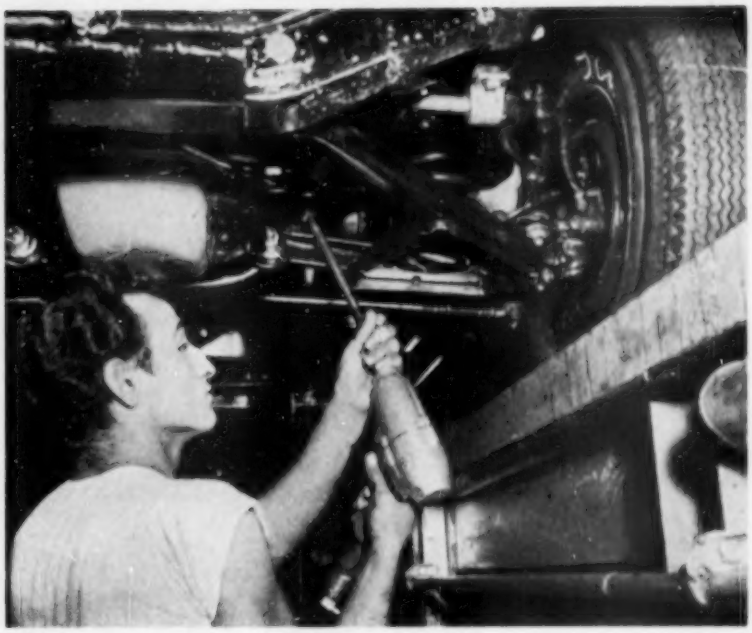
Job 1—Most important use of the new tool is securing the engine mount to the automobile body-frame cross member (Photo 1). In this pit operation four ⅝-in. bolts are run to a 40-45 ft.-lb. torque, two on each side of the engine mount, as the nearly completed car passes overhead on the assembly conveyor belt. Limited work space and inaccessibility of bolts make the job difficult. Tools must be equipped with an extension bar and universal joint to reach bolts.

With a conventional air tool run to a stall, the operation was hazardous. Total applied torque was transmitted through extension bar to operator at an angle when nut tightened, and before he could shut off tool. Because of the difficulty in positioning socket on bolt, the operator could easily be cut. Torque varied considerably, often falling well outside the specified 40-45 ft.-lb. range. A 100% check by hand torqueing was needed to protect against sub-par quality.

Using a standard Impactool with the same attachments improved but did not solve the problem. This tool did not transmit any torque to the operator, but it was still impossible to control torque by timing the impacting. Operators frequently stripped bolts. Full hand torqueing was still required. And replacement of stripped bolts was an expensive operation.

The new Torque Control Impactool not only eliminated the safety hazard. It has also made torque control possible—with uniform quality. The tool's automatic shut-off has eliminated over-torque, also the problem of stripping bolts. Tool can work at full operating speed, since the pre-set torque in the torsion bar

to engine...



Job 3. Steering gear to frame

on Fast-Moving Assembly Lines

automatically stops it—does the job in less time than conventional air tools.

Job 2—On the passenger-car line, the new tool is also attaining precision control of torque at high operating speeds. All Ford automobile transmissions (standard, overdrive, and automatic) are bolted to the engine (Photo 2) by four ⅝-in. bolts at a torque of 45-50 foot-pounds. The job used to be done with an angle-type air tool run to a stall. An extension was used to reach the bolts, the angle tool was awkward to handle, and torque control was uncertain.

The new tool does the job quickly, stops automatically as required torque is reached, assures production uniformity. Its compact 1-in. side-to-center-width makes it easy to position.

Job 3—On the truck assembly line the new wrench is doing another important job—securing steering-gear assembly to truck frame (Photo 3). Here three ⅝-in. hexagonal bolts are run to a torque of 45-60 foot-pounds.

With the conventional air tool previously used, considerable variation in torque occurred. The operator could never be sure bolts had been tightened within torque specifications, and each bolt had to be checked with a hand torque wrench.

The new tool, with torque preset in the torsion bar, quickly runs the three bolts to the prescribed torque. Operator no longer has to put a hand torque wrench on each bolt; only an occasional spot check is needed. A time-consuming and fatiguing operation is eliminated, quality control is assured.

HOW WRENCH WORKS

The new Impactool incorporates the first application of the torsion-bar principle to a torque-control tool—running a nut to desired torque, then automatically shutting itself off. Tool operates at full power and speed until nut-running resistance is equal to the stress preset in the torsion bar. Impact mechanism then rebounds and trips a rubber-faced shut-off valve. Torque setting of the tool can be adjusted in a few seconds. Once set, tool runs nuts and bolts consistently to desired torque. Ford uses 6¼-lb. tools, with either of two torsion bars, one with maximum torque of 60 foot-pounds, the other with maximum torque of 90 foot-pounds.

Maintenance man runs test bolts on a torque analyzer, adjusts tool setting until it gives required torque reading. Adjustment is done on a jig that twists torsion bar and calibrated collar to desired torque. Calibrated sleeve slides on, locks torsion bar to driver.

When a section foreman sends a tool to the maintenance department, he attaches a tag giving specified torque so tool can be set and checked before return to the line.

Lost time trimmed, production problems ironed out...

If this old plant with its high humidity could be air-conditioned at reasonable cost your plant, too, can have climate control

with tailor-made air from package cooling units

Cooling an "Impossible" Plant

Now your air-conditioning problem won't look so tough or so costly—when you see how Daroff cooled off a steamy old building and sewed up some solid gains.

YOU'RE LOOKING at a big, old, men's clothing plant (photos above and left). The Daroff plant in Philadelphia. It's full of steam pressing machines (top, left) and handwork rooms (above). Everybody said it couldn't be air-conditioned. Not economically, anyhow. It *does* look like an unlikely candidate. But it *has* been air-conditioned. With these results:

. . . *Not an hour of lost time* chargeable to summer humidity since the system was installed (completed and dedicated August 1).

. . . *Morale vastly improved* among employees all down the line.

. . . *Production requirements now met* with just one straight-time shift (not even overtime could make up for hot-weather shutdowns).

. . . *Quality control much improved*—in big strides.

. . . *Individual output 'way up.* One woman, for instance, now sews buttons on 20 more suits than she did in the same period B.A.C. (before air-conditioning).

And that's not all. The new air-conditioning system produced two further benefits:

. . . *Helped the company hold the price line* in the face of an advancing market.

. . . *Brought in lots of job-seekers* even though there's a tight labor market throughout the clothing industry these days.

Turn the page

Begins on page 142

"Air in the shop is cleaner and more healthy"

HOT PROBLEM

Remember the times you've walked into your home-town dry-cleaning shop on a hot summer day, felt the hot vapors from the steam presses, pitied the sweating operators? Glad to get out? You sure were. Air-condition the place? Never. It would cost too much.

Now multiply that feeling of yours by many batteries of steam-pressing machines, each giving off hot moisture to the air. Add hundreds of workers on each floor of a large plant. Throw in the quality-control problems of fitting cloth together piece by piece into the finished product, with hot irons and steam presses needed to shape the goods. Then add the fact that wool absorbs half again its own weight in moisture under humid conditions, thus complicates the art of precise sewing and fitting. Now you begin to see the size of the problem at H. Daroff & Sons, Inc.

Daroff runs the huge seven-story block-long plant in the photo, makes Botany 500 and Worsted-Tex suits. What used to happen on hot, muggy summer days? Daroff had to shut down. In a typical summer lost time might add up to two or three weeks. Workers lost wages. Daroff lost production at a critical time—the busy summer season when fall and winter suits are in production. Unit costs went up. Not a happy situation in any industry, not to speak of the competitive garment industry.

For ten years Daroff chewed on this problem—got quotes, facts, figures. Everybody said, "No. No satisfactory air-conditioning for the price you're willing to pay." But Michael Daroff, president, is a forward-looking man. He finally got the answer he wanted (packaged units instead of a conventional central station) at a price he could pay (substantially under $500,000, installed). Got it from G-E, which proposed packaged units with limited use of plenums and little duct-work—at one-third the top price. Mike snapped it up, got Joe Diamond (Republic Air Conditioning Company) to engineer and install the job.

COOL ANSWER

Hold your hat while you read these figures: Sixty-eight 15-ton water-cooled units on the four manufacturing floors (2nd, 3rd, 5th, 6th) that accommodate coat shops. These are high-humidity areas, where water-cooled units do the best job. On 4th floor (cutting area, where humidity isn't so high and less cooling capacity is needed), fifteen 5-ton air-cooled units. A 60x30x 35-ft. cooling tower on the roof, cooling 3600 gpm. of warm water discharged from condensers of the 68 water-cooled units. And 1750 kva. of electric power added to supply the package units and the four 40-hp. motors that operate the cooling-water system pumps.

The first floor? No manufacturing. The top floor? It's an administrative and office area, was air-conditioned several years ago, is not a part of this story.

New feel for an old building—Daroff's plant used to be a John Wanamaker laundry (210,000 square feet). Floors: reinforced concrete, 11 inches thick. Headroom: 16 feet on all floors. Rugged construction made it easy to install the 1600-lb. ceiling-hung package air-conditioners. No wasted floor space. The 132,000-lb. wetted-weight cooling tower was installed right on the roof by distributing the weight to columns via steel beams.

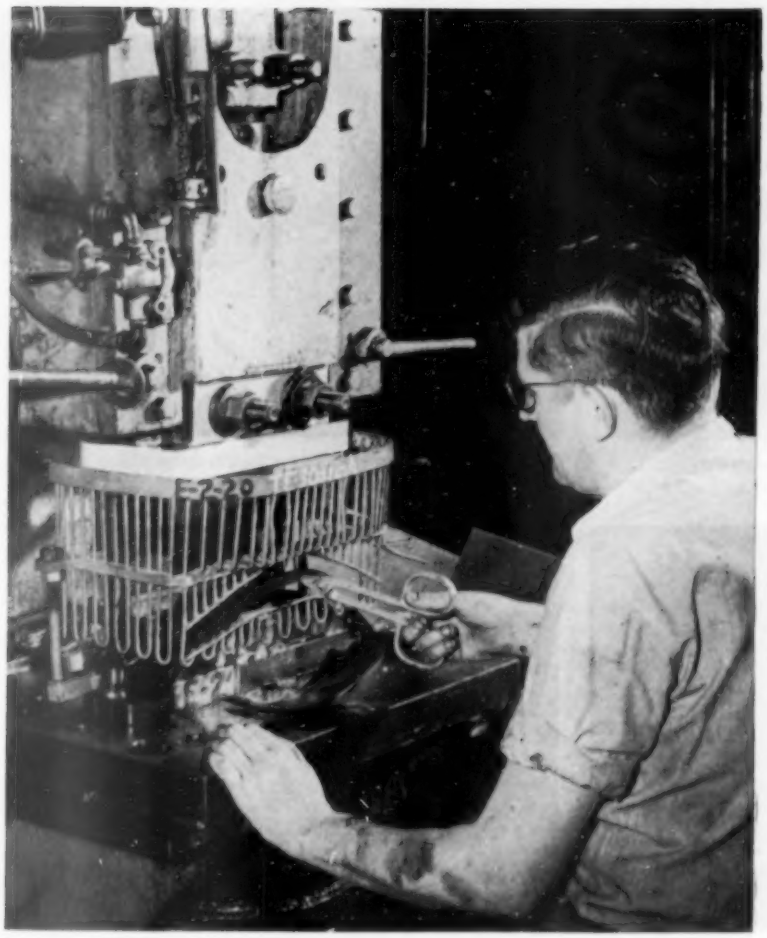
There are four corner units on each floor. They bring in outside air through short duct runs. Each of the remaining 13 units does only a recirculating job. Air change is provided by two exhaust fans per floor (in service B.A.C.) and by overflow through elevator shafts, etc. Each unit has its own thermostat, maintains an average of 78 F. (dry bulb) and 50% relative humidity for standard design conditions laid down for Philadelphia.

Major virtue of the package units? They are concentrated—and give humidity control—right where the principal humidity sources are located. Also each unit is individually controlled. This way, if one motor fails, the effect of the stoppage is confined to a small area. And they are flexible too. If Daroff ever adds more steam presses, it can add more package units as needed. This means Daroff will spend no more money until and unless it's needed—except for the moderate investment already made in slightly oversized power and water lines. One more thing: The package-unit approach is better (for Daroff) than a central-station system with its fixed maze of ductwork. Why? Because if business grows enough to force relocation, the package units can be taken right along with minimum low cost.

Today, the air is not only comfortable. It's clean, too. It used to be heavily loaded with dust and lint from the thousands of garments that are handled every hour. Now, constantly circulated through filters in each package unit, it's almost dust-free. Big help in dust-control: Absence of distribution ductwork means no hidden surfaces within inaccessible ducts to gather dust and create maintenance problems. Says Mike Daroff: "The air in the shop is cleaner and more healthy. Allergy and hay-fever sufferers no longer complain even during the height of the pollen season. The morale of our members is high and they are actually happier in their work."

Picking up loose ends—To help reduce sensible heat inside the plant Daroff carried out a $30,000 auxiliary program. This included insulation of steam piping and steam presses, plus adding a tinted plastic coating (Sun-Shield of South Jersey, Camden) to windows on the sunny side. The coating reduces solar heat transmission.

COMING . . . How a West Coast company built a new plant to get better handling, better quality, faster production—all adding up to better service to the customer.



This birdcage will give you a...

New Slant on Die Guards

And get this: 178 of them cost only $9000—about half what five accidents cost the year before adoption.

THINK die guards slow production down? Then you'll want to take a look at A. O. Smith Corporation's Kankakee (Ill.) plant. You'll find you couldn't be more wrong. Actually in that plant *die guards on punchpresses are boosting output.* Operators are safer—and therefore work more efficiently.

That's not all. Since installing individual die guards over a year ago, the company credits them with these benefits:

. . . *Best in safety.* In fact, no accidents at all in the first year. (Minor injuries, like small cuts, are charged up to materials handling rather than punchpress operation.) In the year before die guards were installed, operators had five major injuries.

. . . *Rock-bottom compensation costs.* In the first year since die guards were installed, no cost at all. The five accidents the year before cost $17,500 in workmen's compensation. The die guards paid off in about six months.

. . . *Simplified maintenance.* The guards are simply designed, need little maintenance. If they need repairs, they're just unbolted from the studs and repaired.

. . . *Easy set-up.* No adjustment is necessary during die changes because the guard is permanently attached to the die. Old pressguards needed adjustment whenever dies were changed.

. . . *Low-cost storage.* No extra space is needed because the guard is an integral part of the die.

. . . *Double safeguards.* New guards get two inspections—by set-up men as well as safety men—every time there's a die change.

. . . *Tamper-proof operation.* Finally (and highly important) operators cannot make unauthorized adjustments in the guards.

How guards work—A. O. Smith designed and built the birdcage-like guards to individual die requirements. They resemble guards recommended by American Standards Association—and meet with state and insurance-company approval. They're made of hot rolled steel bars welded to strip-steel and angle-iron supports. The whole assembly is bolted to two studs, can be easily removed for repair or adjustment. Studs are brazed to the bottom die plate.

The guards completely enclose the dies. Through openings in the front the operator can position pieces with tongs, magnets, and suction handling devices, if necessary. Pieces are removed by the same handling tools or by air blast. There's not enough clearance for the operator to put his hand through.

Today the Kankakee plant has 178 of these guards. Total cost: $9000. Average cost to equip a die with a guard: $7 for material, $43 for labor. About 75% of the plant's dies now have individual guards; soon all will be equipped with them. and new dies still to be made will have guards attached before they are put to work.

Why the change?—Formerly general-purpose guards were used on small and medium presses (80% of the presses in the shop). Large presses, equipped with two-hand trip switches, and no guards. Guards were ineffective because operators could squeeze their hands through the guards into the danger zone—and because operators adjusted the guards for convenience, not safety.

Has your company's in-plant communications system kept pace with its expanding manufacturing facilities? If not, here are ways to cut costs, save time, and speed production

1 **TELESCRIBER** reproduces handwritten phone messages; also simple sketches. Saves supervisors' time.

4 **INDUSTRIAL TV** helps control equipment from operator's station. Also will improve plant protection.

5 **DESK PHONE AMPLIFIERS** enable anyone in room to participate in conversation. Valuable for conferences.

Seven steps to

Tops in In-Plant Communication

TAKE ONE PBX system. Add the seven kinds of communications equipment shown above: telescriber, telephone answering service, teletype, industrial television, desk telephone amplifiers, tape recorder, public address system.

That was our answer when we found our communications system wasn't keeping pace with our manufacturing activities. Now we're happy about the whole thing. We think we've gone about as far as we need to go right now. Each addition—made after careful evaluation and planning—has paid off by:

. . . Relieving management and supervisors of answering unimportant phone calls.

. . . Cutting the hidden costs of personal phone calls.

. . . Speeding transmission of messages to and through the shop (eliminating many production delays).

. . . Weeding out needless calls.

. . . Eliminating mistakes that result from spoken—rather than written—messages.

Our start—Like many plants, we had operated our telephone facilities in the same way for years—without seriously questioning it. We had a PBX system, with an attendant on day duty five days a week. She directed all incoming calls to their extensions, connected extensions with outside lines; also acted as receptionist, Western Union clerk, message center, mail clerk, tool accountant, and general information center.

Since our manufacturing divisions

By J. D. STALEY, Personnel Manager, Peter J. Schweitzer, Inc., Spotswood, N. J. (Mr. Staley has since become Asst. Manager, Personnel Div., American Management Association, New York City.)

2 **TELEPHONE ANSWERING SERVICE** records incoming calls nights and weekends. Tolls now at a minimum.

3 **TELETYPE** speeds message transmission. Permits fast tab-equipment processing of hourly payroll.

6 **TAPE RECORDER** takes down summaries of points discussed at conferences, etc. Promotes follow-up.

7 **PUBLIC ADDRESS SYSTEM** locates individuals, gives orders to shops, and receives acknowledgments.

operated around the clock, seven days a week, we set up direct night telephone connections on certain extensions in the shop.

The plant also had (and still has) an intra-plant dial telephone system, a courier service (twice daily) through the plant, and a pneumatic-tube system connecting administrative offices with production control.

This system worked well for years. But, gradually, as our manufacturing activities more than doubled, we found our communications system just wasn't keeping pace. Here's what we did about it:

1 **Telescriber**—This equipment reproduces handwritten messages and simple sketches. It has been installed between production and supervisors' and foremen's offices. We found supervisors were being called to their offices with annoying frequency to answer phone calls that required no reply (such as production reports). A few days after installation, these TelAutograph telescribers were in frequent use—helped along with some well-timed publicity. Non-urgent phone traffic dropped rapidly, and the waste of supervisors' time with it. Foremen now have written reports waiting for them—and the net result is improved production control.

2 **Telephone answering service**—Devices are connected to phones on direct hook-up nights and weekends. When set in operating position they answer incoming calls with a recorded message. This identifies company and department, explains the phone is unattended, that the caller has 30 seconds to leave a message that will be recorded.

Before these instruments were installed, calls on each incoming line averaged 12 to 20 per night. A study showed excessive toll charges at night to non-business phones at nearby points, and unexplainable long-distance tolls. We found individual phones were tied up on local calls for as long as 40 minutes. And because of the area our process foremen had to cover—and the ready availability of direct night-line connections, it was impossible to achieve good control.

One week after installation of the service, incoming calls dropped to two or three per night. We were able to remove half the direct connections. Rest were placed in foremen's offices (no longer accessible for friendly chatting). Toll charges have dribbled to almost nothing.

The foremen check every 20 to 30 minutes to follow up on messages. They are relieved of answering the phone a score of times a night. No more wrong numbers, hang-ups, conversation-seekers. And

Begins on page 146

"All these devices will cut costs, speed production"

callers appreciate receiving an answer even when the foreman is busy.

We still have to provide for emergency calls to employees, calls on rail car movements, power transmission instructions, etc. One direct line is left for these—attended by the powerhouse engineers on duty 24 hours a day.

3 Teletype—After careful study of communication traffic among five of the company's plants (in New Jersey, Pennsylvania, and Massachusetts), a teletype tie line was leased, and transmitter-receivers were installed at each mill. The "rent" was absorbed easily by the reduction in telephone tolls between plants. In most cases, transmission of messages is now more rapid—and their precise, brief form results in indirect savings.

More important are savings from automatic tab-equipment processing of the hourly rate payroll—possible only with the teletype. Payroll is prepared on a teletype tape cutter, and at the day's end is sent to central accounting in Lee, Mass., at 120 words per minute. Tape is fed to an automatic transmitter.

4 Industrial television — In our plant the operator of stock-preparation equipment controls a pulp-washing machine two floors above him. The equipment is subject to stop-ups. At frequent intervals, the operator had to climb the stairs to check the washing. Sometimes the machine used to stop up while he was on the way down.

The remedy: a TV "eye" focused on the pulp-washing apparatus, and a monitor at the operator's station. Now he can check the progress of pulp-washing from his station.

We also plan to install a television system to improve plant protection —by giving guards a view of remote areas that now receive infrequent checks.

5 Desk telephone amplifiers—We have found many advantages in a desk-type amplifier and receiver in conjunction with the PBX extension. With it, a phone conversation can be carried on as much as 20 feet away from the phone. Anyone in the room can participate. And the user has both hands free for writing or checking documents during the call. We've found them especially useful for conference calls, where the caller is providing information to all the conferees.

6 Tape recorder—Instead of recording entire meetings, we usually record only a *summary* of each point discussed in production conferences, union-management debates, foremen meetings. These summaries are transcribed by a stenographer and distributed to participants when required. Biggest advantage is that it promotes the all-important follow-up phase of meetings and conferences—something that was sadly neglected before.

7 Public address system—This is used to locate individuals, give orders to maintenance shops, and receive acknowledgments. A system of signal bells within the plant enables the PBX attendant to find individuals for calls quickly.

What of the future? We're investigating the use of two-way radio and completely automatic dial telephones—in fact, any device that we feel will further cut costs or speed production.

YOU BE THE ARBITRATOR

THE CASE OF

The Irresponsible Workman

Out of the experience of the American Arbitration Association

Pete B. operated an automatic drill press that bored holes in automobile engine blocks. Depth of the holes was set by a group leader. All Pete had to do was keep his machine going, check one out of every five engines with a plug gage to make sure it was all right. If anything seemed to go wrong, he was to call the foreman.

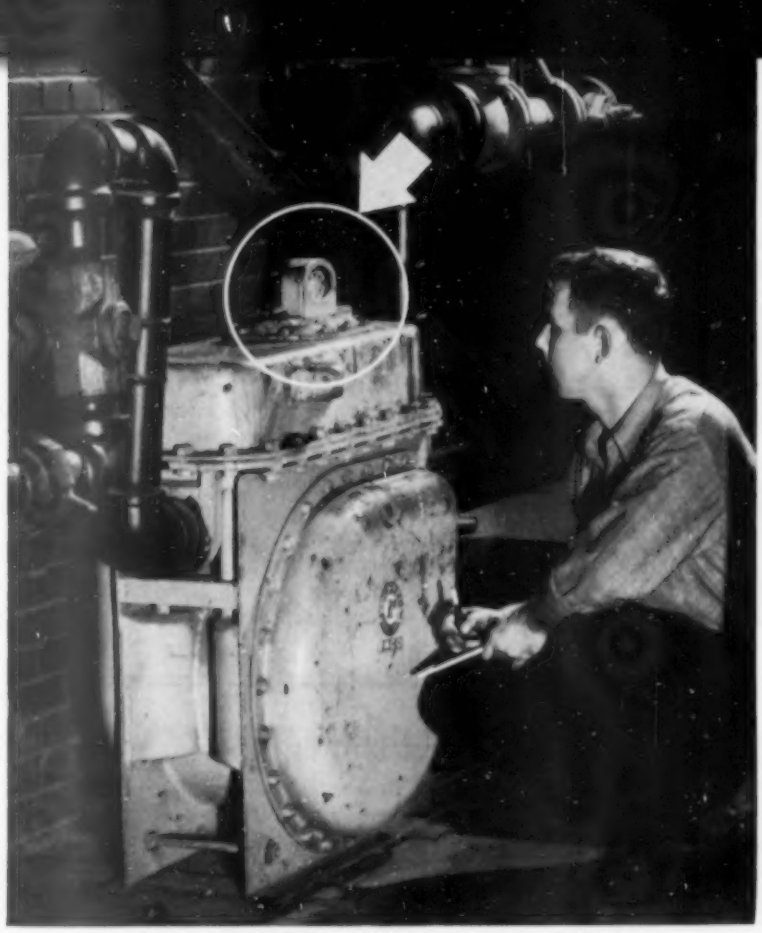
One day it was found that 14 engine blocks had come off Pete's machine with the holes bored too deep. The work was a total loss. The company gave Pete a one-week layoff. The union protested.

"The drill press operator doesn't set up the machine," argued the international representative. "That's the group leader's job. You can't punish one man for a mistake committed by somebody else."

"There's no excuse for a man working with his eyes shut," cut in the foreman. "If Pete had used the depth gage as he was told, he wouldn't have made so much scrap."

Finally the case went to arbitration. If *you* were the arbitrator, how would you decide?

For the actual decision turn to page 334



IT'S METERING FOR YOU, TOO . . .

If You Really Want Fuel and Power Facts

By-guess-and-by-gosh isn't good enough today for any company that's shooting for most efficient operation.

"WHAT? Spend $15,000 just to get fuel and power meter readings? You're crazy—there's no payoff to justify it."

That's the typical reaction of many plant managements when they are faced with the problem of getting more accurate fuel and power consumption figures.

"We'll do it the regular way—estimate it. It's close enough."

But not close enough for The Carpenter Steel Company (Reading, Pa.). To date it has spent $15,000 on fuel meters. And it's going to spend more. Results have been so gratifying that it's now standard practice to put a meter on every new or rebuilt fuel or power eater.

Says A. A. Britton Jr., vice president of production: "We now know our operating costs in better detail. They are the key to efficient production and continuing plant-engineering improvement. Already savings have far outweighed the cost."

Carpenter Steel used to do it the old way. For gas, you broke down the main meter reading by departments according to operating hours and size of pipeline. If you wanted an individual process cost you simply boiled it down further. For oil and electric power you worked it the same way—operating hours, feedline size, or motor horsepower. Strictly a mathematical calculation. Accountants have to do it all the time when they distribute expense items and overhead.

Accuracy needed — About two years ago Britton suspected the plant wasn't getting true fuel costs on some processes. Carpenter Steel has many different kinds of batch and continuous annealing furnaces. Heat treating is an important part of its operations. Many furnaces are equipped for dual fuel supply—gas or oil. And they operate at different temperatures, running up to 2500 F., where fuel efficiency is always a big problem. Also, automatic controls vary the flow of fuel according to need (there's no constant rate of flow). This certainly isn't a firm basis for reliable costs.

So Britton called in Harold Miller, chief plant engineer, to analyze the problem. Obviously, they agreed, only individual meters could give them the facts on fuel consumption. So they tried a few Rockwell meters. The results showed that the old accounting guesstimates were often 'way off the beam. Even two furnaces of the same make didn't use the same amount of fuel—in fact, usually far from it.

That settled it. The meter-installation program went into full swing. Today Carpenter Steel has 19 gas meters and 51 oil meters on its heating-fuel mains and feeders to furnace units. And 29 watt-hour meters on electric-heated furnaces.

Installation wasn't difficult. Meters were set in place during work hours, cut in over the weekend or a holiday—a 20-hour job at most.

Monthly report—The meter program has other benefits. Each month a report of fuel consumption goes to departmental superintendents, chief plant engineer, production engineer, mechanical engineer, chief accountant. It shows fuel consumption, increase over previous month (or decrease), hours of operation.

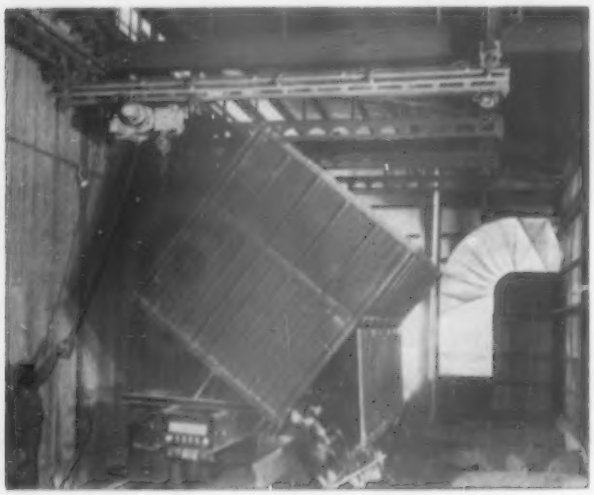
The chief accountant now has a reliable basis for distributing fuel costs. The production men, with knowledge of accurate process-unit costs, can use furnaces more effectively. And the chief engineer can check furnace performance, spot the bad actors, make any necessary repairs. Accumulated data help greatly in selecting future equipment.

FACTORY | COST-CUTTERS

By WALTER F. WAGNER JR., Associate Editor, FACTORY

Newest Use for Corrugated

Damage to plastic clock dials has been cut 90%, and inspection time 40%, by the development of this neat and simple packaging method. G. Felsenthal and Sons, Inc. (Chicago), used to tissue-wrap its dials one at a time. But now gets better results—at less cost and in quicker time, by "filing" the dials in slots formed by corrugated lining in shipping cartons. Not only is packaging time cut at Felsenthal—time is saved on customers' assembly lines as well. Assemblers no longer have to unwrap individual dials—in fact, have a ready-made parts tray.

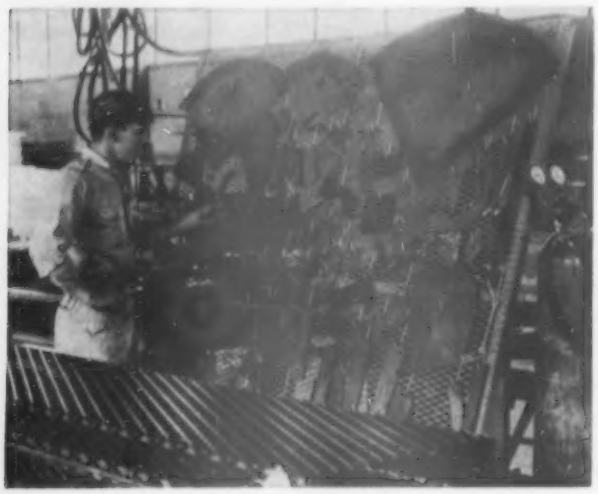


Quickest Unload Yet

Won't work if you're unloading Christmas tree balls. But could save real time and money if it's a product that can take rough handling. The Los Angeles By-Products Company (in L. A.) salvages cans delivered by city rubbish trucks (cans are used for copper refinishing). And—as the photo shows—empties them by tipping truck container with cranes.

The trailers were built for the job. The container is hinged to the truck bed on one side. Tipping is limited to a safe angle by a safety link and safety chains (which are visible under container).

Tilting is done by a pair of linked, 6000-lb. Cleveland Tramrail cranes. (One crane of each pair lifts an end of the container.) Bridge travel and hoist of unit is pushbutton-controlled; but travel along craneway is by hand, so unit is free to move with the pull of the load. There are two units on craneway.



Expanded Use of Expanded Metal

The business of T. J. Cope Inc. (Collegeville, Pa.) is fabricating cable trough from large sheets of expanded metal. But using the expanded metal to make troughing isn't enough for the plant men. They keep coming up with ideas on how to use their product to make handy items for use around the shop.

For instance: the rack shown was made by the workers for pattern storage at the gas-torch-cutting operation. (The patterns are used to cut out shapes from steel plate.) All it takes is a small hole in the pattern (a minute's work with a torch) and a wire hook to hang the pattern anywhere on the rack. It saves space, keeps patterns from getting lost, makes it easy for operator to find the right pattern.

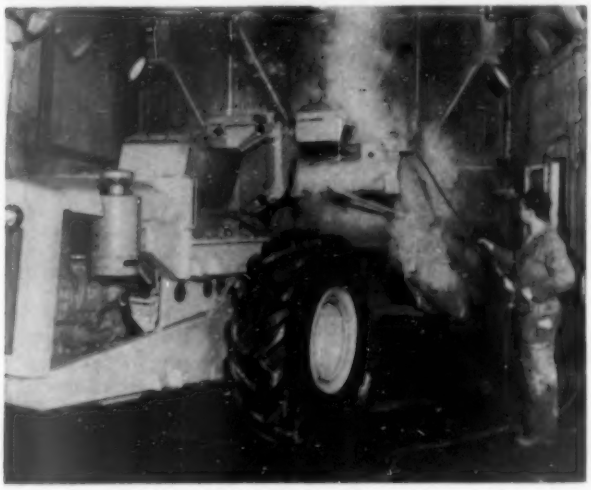
Another off-beat use of expanded metal: as bookshelves in the engineering department. The metal is cut into foot-wide strips, bolted to wall racks.

Slick Inside Job (of Brazing)

The assembly shown, part of a Columbia bicycle frame, is the tube that supports seat post. Because it gets a lot of strain, the upper end of the tube must be reinforced with a short tubular insert. The trick: brazing them together.

The insert is coiled from flat strip, with a ¼-in. gap to permit compression. It's coiled a hair oversize to provide a force fit. At the time the insert is punched out, a dimple is pressed into each side.

To make the assembly, the operator lays a piece of brazing alloy into each dimple, and holding them in place with his fingertips, taps the insert part way into the tube. Then he brushes the protruding half of the insert with flux, taps it down flush. And the assembly is ready for heating to brazing temperature. (Both the silver brazing alloy, "Easy-Flo," and the flux are products of Handy & Harman.)

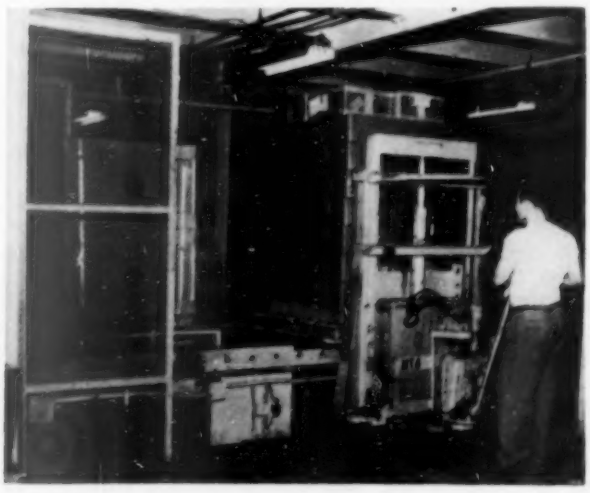


How to Clean a Giant

Just like little parts, huge units like this earthmover need cleaning and degreasing. But it's sure not convenient to dip 'em. LeTourneau-Westinghouse (at its Peoria, Ill., plant) had this problem: After assembly, units are covered with grease, cutting and welding oils, oil stains left by assemblers, considerable dirt (sometimes mud) from test runs.

LeTourneau-Westinghouse used to use a vertical fire-tube boiler that turned out steam at 30 psi. It had to be backed up with supplementary cleaning using a solvent solution through an air or solvent gun.

Recently, however, the company switched to a high-pressure combination cleaner (Malsbary Manufacturing Company, Oakland, Calif.). It puts out steam, mixed with a detergent solution, at a quick-cleaning 300 psi. Time saving: a well-worthwhile 40%—plus less labor, water, fuel, and detergent.



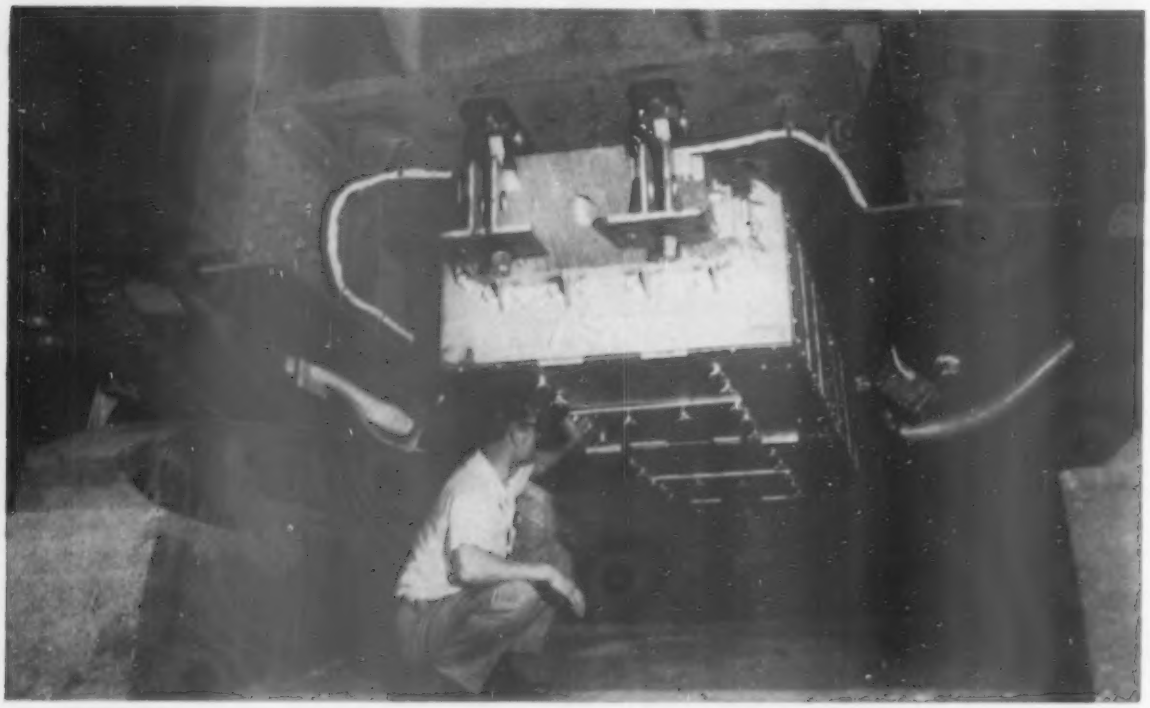
Got Multi-Story Problems?

Then you'll be interested in the system set up at RCA's Bloomington (Ind.) TV assembly plant. It moves a load (up to 3000 pounds) a minute between first-floor storage and basement assembly areas—with an automatic conveyor system. In operation, a load is placed on a horizontal conveyor (on either floor) by fork truck. Load activates a limit switch, which starts the live-roll conveyor and moves load into a vertical conveyor. There, the load trips another switch, which starts load moving up (or down) at 30 fpm.

At the receiving floor, more limit switches stop the conveyor, move the load out onto the unload conveyor. The load stops automatically at the end of this conveyor and is held there for pick-up (as in photo).

Safety stops, and pushbuttons to control travel direction, are conveniently located. System was manufactured by Gifford-Wood Company, Hudson, N.Y.

By W. A. STANBURY JR., Associate Editor, FACTORY



Purer Steel the Sure-Fire Way

Newest way to better steel for castings—no sulfur, no phosphorus—is this electric induction stirrer.

If you want purer steel for better castings, look at the photo above. The box-like thing you see, suspended about an inch below a 50,000-lb. electric arc furnace, is an induction stirrer. It's the first one ever used to produce better alloyed steel castings.

It's installed at G-E's steel foundry, Schenectady, N. Y. And produces melts with hardly a trace of phosphorus or sulfur and little or no loss of metal, gives accurate control of grain size in austenitic steel, cuts stratification, slashes refining time.

The induction stirrer is a water-cooled coil that resembles part of the stator of a large two-phase induction motor. The coils are encased in a steel container that's curved to fit the furnace contour. The two-phase winding is excited by alternating low-frequency currents. The traveling magnetic field induces eddy currents in the molten bath. The magnetic field then reacts with the excitation field, and creates a stirring force that moves the melt across the hearth bottom, upward and sideward.

Result: uniform temperatures, accurate prediction of final alloy adjustments, representative sample analyses of the entire heat.

Coming: Automated Rolling Mill

Just press a button. That's all the operator will have to do to start up a detailed rolling schedule in Jones & Laughlin's Aliquippa Works. When? Before the end of this year. It will give J & L the steel industry's first completely automatic card-programmed rolling mill. The operator will select the right IBM card from several pre-punched for each schedule, thus obtain a definite set of reductions while allowing for variations in temperature and composition among individual slabs.

Call the system by its name—Prodac. That's short for programmed digital automatic control. (Westinghouse's Motor and Control Division developed the system.) Cards will be prepared for nearly every slab and strip size and grade of steel, thus insure proper drafts and speeds to produce uniform products at high speed. Each card will include all requirements of a given schedule—screw-down opening, edger adjust-

ment, and edger speed. After data from cards are transferred to a transistorized memory-storage element, the mill is ready to roll at the touch of a button. Reversing is done by sensing devices. Roll openings and mill speeds are readjusted in line with the schedule in the memory element.

Flashes and Briefs

Big store of scientific and technical knowledge will be available in about three years when multivolume McGraw-Hill *Encyclopedia of Science and Technology* comes off the press. Contents: 7000 pages (about 10 volumes), with several thousand cross-indexed authoritative articles.

Big mix—up to 20,000 pounds per batch—comes from stainless-steel blender, believed to be largest of its kind, now working on classified projects for Atomic Energy Commission in Missouri. Mixing action is four-way. It's made by Sturtevant Mill Company, Boston.

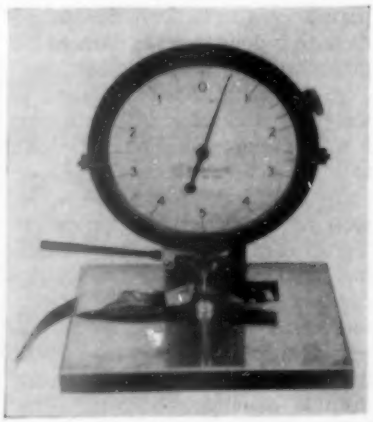
Big opportunity to buy your own nuclear reactor comes from announcement by Aerojet-General Nucleonics (San Ramon, Calif.) that it will mass-produce small, portable, self-contained reactors. Uses: research, training power-station operators, testing and analysis.

Big dose of chlorine can't get loose in your plant if you use the new Solvay Chlorine Detector (Wallace & Tiernan, Inc., Belleville, N.J.). It will monitor a continuously controlled sample of air, warn when concentration exceeds 3 ppm. Throat irritation begins at 15 ppm.

SUPER-ACCURACY COMES FROM BORER WITH ELECTRIC EYE.

Less Than a Hair's Breadth

Forty times less, in fact. That's the accuracy (0.00005 inch) of the spacing obtained with the jig boring machine above. Operator determines distance between points where holes are to be drilled. Then machine's optical measuring system takes over, reflects measurements on screen by means of photoelectric indicator, thus assures accurate spacing. It's a Linder machine, used by G-E to make precision control parts for small gas-turbine engines for Navy and Air Force.



Just as Thin as You Want It

The metal strip you see in the photo at left is just the right thinness. And it's typical of the accuracy with which Allied Products Division of Hamilton Watch Company (Lancaster, Pa.) now is producing ultra-thin strip.

Allied Products can provide ultra-thin strip in widths up to 4 inches, in thicknesses from 0.010 to 0.00012 inch (uniform to a tolerance of 0.00005 inch)—and from a wide range of metals (very soft light metals up to very hard high-temperature resistant alloys). Special slitting machines also make it possible to cut the strip in ribbons as narrow as 0.04 inch, with edges that are completely free of ripple.

Uses for such thin strip? Automatic control instruments, electronics, and atomic-energy projects; air-operated valve positioners, air relays; light-gage metal springs, laminated shims, feeler gages; computer memory cores, magnetic delay lines, and distributed-constant electrical components.

FACTORY | MAINTENANCE TRENDS

By CARL G. WYDER, Maintenance Editor, FACTORY

ROOF SLAB PANEL GETS THE WORKS IN TEST TO FIND ANSWER TO . . .

How Heavy a Snow Load?

You're not looking at one of those new-fangled swimming pools in the above photo. It's a water tank improvised by engineers of the National Bureau of Standards. Purpose was to check load capacities of roof structures to withstand snow.

In this case the structure gave way at 80 lb./sq.ft.—2½ times the probable snow load for Boston. From such tests NBS has set up a revised code for requirements for "Minimum Design Loads in Buildings and Other Structures." Previous updating was 1945.

In this latest revision most significant changes have to do with wind and earthquake loads. They are both complex in character, relate to many factors. Wind loads, for example, are affected by gusts, height above ground, shape of structures, and other things. Snow loads, however, can be easily simulated and effects tested, as in the photo.

Want the 1955 revision? You can get it from American Standards Association, 70 E. 45 St., New York 17. Code Number is A58·1-1955. Cost is $1.50.

Trend to a New Management Post?

Recently we saw the cryptic title "Facilities Engineer." And then "Director of Project Evaluation." What do they mean? We find they point to a growing recognition of the need for a full-time plant-improvement researcher to match the product-improvement researcher.

Now comes an announcement from Standard Pressed Steel Company, Jenkintown, Pa., of the creation af a new executive post "Director of Plant Improvement." He will report directly to the president. Purpose is to avoid imposing heavy extra duties on the company's regular management team.

Says SPS' president, H. Thomas Hallowell, Jr.; "We must make additional production facilities available to put on the market new and improved products already developed by research . . . cost of facilities has increased . . . concentrated effort is needed so that the capital of SPS will be employed most effectively for the future."

This philosophy hasn't yet reached the band-wagon status. But watch it grow.

Sell PM Before and After You Install

In case you missed this important point in our 23-page special section on preventive maintenance in September, we're saying it over again. Sell PM first to higher management and production men if you want it to succeed. But don't forget to sell it to the maintenance men, too.

Now here's a plant that realized the sale to maintenance men was not just a one-shot deal, but a continuing affair. Says its maintenance superintendent: "We found it wasn't enough to expect our mechanical inspector to discover everything. So we decided to train all our maintenance men to look for trouble and report suspicious spots to their foremen. And we gave each one a card entitled 'The Real Purpose of Preventive Maintenance.' "

This card sums up those purposes well—far beyond the narrow but current concept of PM. We pass the definitions on to you:

1. To maintain plant in such a condition that it is consistently able to perform the jobs for which it was designed.
2. To reduce repairs and shutdowns to a minimum by replacing parts known to be worn before any damage is done to other parts of the machine or its products.
3. To improve the operation of the plant while it is in production.
4. To keep production costs down to a workable minimum.
5. To improve, where practicable, working conditions of operator.

Sort of a 5-dimensional measuring stick, isn't it? How good? According to this maintenance superintendent: "As a result we are experiencing a decrease in the number of breakdown reports and a steady drop in maintenance costs."

KARDEX® Visible Control Plays A Key Role At Boeing

Important production control data is quickly accessible when filed in KARDEX Imperial.

Gives Greater Control Over Production

Saves Nearly $300,000 a year in Clerical Personnel

The introduction of KARDEX pocket panels gave Boeing Airplane Company management greater control over Production. In addition, KARDEX is used for many other important applications throughout the plant... for tightening control over and reducing the space needed for voluminous Purchasing records... for control of vast Inventories of raw materials and spare parts... and in the Personnel Department for maintaining close supervision over the Company's more than 27,000 employees. Also, personnel reference information is available at the "flick of a finger" with Index Visible Rotaries, greatly aiding personnel control.

At each position of a production area one or more KARDEX pocket panels serve as a visual aid. Each pocket houses a job card which lists the parts required for the job, the job description and notes pertaining to it, reference inspection requirements and other pertinent data. The job cards are arranged in sequence of operation on the panels.

Machine loading with SCHED-U-GRAPH assures topflight control.

SCHED-U-GRAPH® aids the personnel responsible for obtaining parts, tools and blueprints for job sequence – the board indicates the time these are due at each machine. It shows the foreman at a glance which jobs need his attention, and the workers the workload that is ahead of them. Get this valuable new Case History

giving the detailed story of visual aids selectively employed at Boeing – how they aid management in controlling operations.

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

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Kindly send Case History CH1041 – "Empire Building In The Sky."

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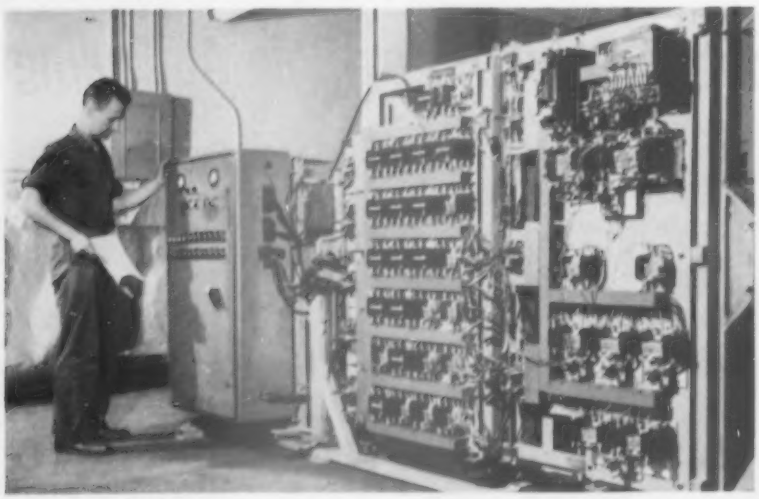


TEST-CABINET LIGHTS (LEFT) SIGNAL PANEL FAULTS. CAM DRUM SIMULATES OPERATION.

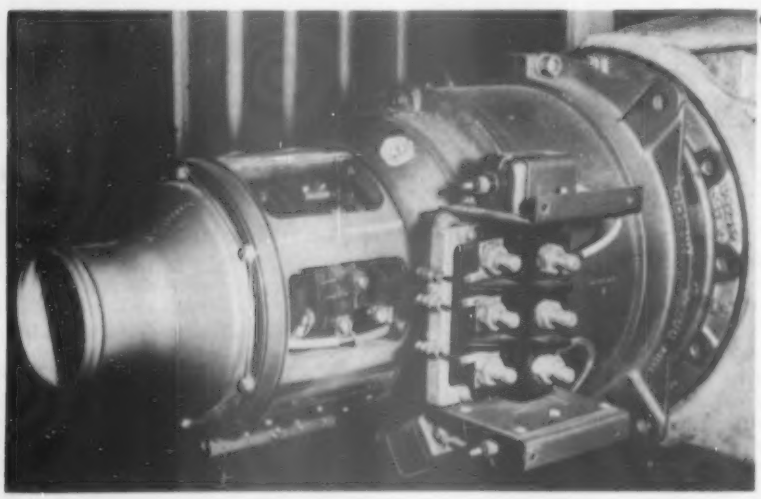
New Device Cuts Wiring Test Time 99%

It used to take electricians at Warner & Swasey Company (Cleveland) a good five hours to check machine-tool cycle control and motor-control panel wiring. They did the job manually, using a continuity checker. But now they've got a new testing device—shown above—that does the job in a little over two minutes. Here's how it works:

The panel for testing is placed on a mounting rack (at right, left photo). It's connected to the test-center panel (far left) by using electrical connecting blocks operated by quick-acting clamps. (The wiring set-up can be changed quickly when changing over to test panels of different design.)

A pushbutton starts the 1/6-hp. motor that drives the device's hardwood cam drum. As the drum rotates, it actuates—in sequence—a series of some 40 switches that set up relay circuits simulating actual operation of the machine tool.

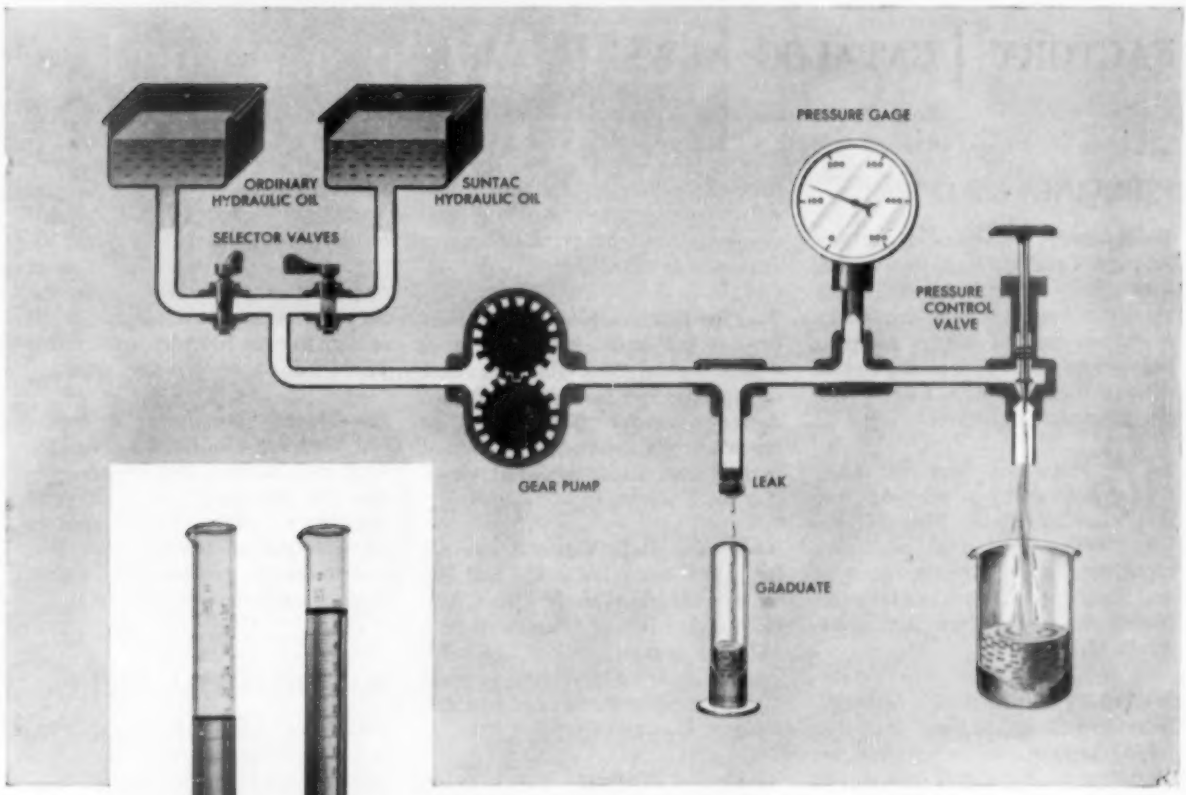
As each switch is actuated, it opens the direct power circuit to the drum's drive motor; instead, power is carried to the motor through the control-panel circuit under test. If this circuit is faulty, the drive motor stops. A signal light on the test-center panel indicates the circuit involved—pin-pointing the trouble.



Plastic Cover for Better Inspection

A transparent plastic air-blast cover installed over generator commutators is a boon in conducting operational tests at Martin Aircraft, Baltimore. Arcing between brushes and commutator can be observed at all times—for as long as necessary.

Martin engineers used to simply remove the solid air-blast cover. But this meant that inspection time had to be curtailed; since, whenever the cover was removed, the cooling air flow was diverted. Wouldn't this transparent cover idea be useful on other jobs?



The leak rate of ordinary oil vs. Suntac was measured in test machine simulating a typical leak in a hydraulic system. Oil viscosities were equal, time and pressure conditions identical. The simple act of switching from the ordinary oil to Suntac, *without any other changes*, reduced oil leakage by 50%.

PRESSURE SYSTEM DESIGNED TO LEAK PROVES SUNTAC CUTS OIL LOSSES UP TO 50%

If you're having troubles with excessive oil leakage, a Suntac® oil can help you. Because of their unusual anti-leak characteristics, Suntac oils reduce oil consumption up to 90%, users report.

Suntac oils will not gum up or otherwise harm circulating systems. These oils are high-quality petroleum products with a life expectancy longer than that of ordinary hydraulic and circulating oils.

A change to a Suntac oil can lower your oil costs... improve housekeeping... result in safer working conditions.

Your Sun representative can tell you more about Suntac oils. Or write for Technical Bulletin 23. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. **F-11.**

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

FACTORY | CATALOG NEWS

To get these catalogs, circle item numbers on the Reader Service Card next to back cover.

PIPELINES & FITTINGS

1—Hydraulic Valves. Handsome 92-page Catalog H-12 is crammed with photos of typical installations, cutaway drawings, flow schematics of valves needed for a complete heavy-duty oil hydraulic circuit. Also performance data. *Commercial Shearing and Stamping Co.*

2—Spray Nozzles. Over 100 industrial spray nozzles of all kinds and sizes are illustrated in 28-page Catalog 5600. Operating principles, capacities, applications, spray angles, and other specifications are featured. Numerous cutaway views and tables. *Binks Mfg. Co.*

3—Tubing Supports System. Bulletin 656-G (20 pages) describes tubing supports and accessories for all industries. Data and drawings of straight sections, connectors, fittings, trough, covers, raceway, fastening devices, junction boxes, and hangers. *P-W Industries, Inc.*

4—Solenoid Valves. Condensed Catalog No. 201 is a 32-pager about 2-, 3-, and 4-way packless valves; pilot-controlled types; strainers and filters. Includes helpful general data; photos; water, air and gas, steam flow charts; and a selection chart. *Automatic Switch Co.*

5—Valves. Eight-page Bulletin 56C describes a wide range of automatic pressure, temperature, and level control regulators. Practical info for production men with special processing control problems; for heating, power generation, other applications. *Atlas Valve Co.*

6—Armored Cable Tubing. Multitube system of installing instrument and control tubing is explained in 12-page technical bulletin 356. Illustrations show regular copper and polyethylene tubes; four different corrosion-resistant types. *Crescent Insulated Wire & Cable Co.*

7—Pipe Benders. How to bend rigid or thin-wall conduit is subject of 4-page Folder 556. Illustrates line of pipe benders featuring calibrated degree scale for making accurate repeat bends with ease. Contains performance data, exploded views. *Gustave Lidseen, Inc.*

8—Bronze Globe Valves. Two types for many uses, rated at 150 and 200 lb., are presented in detailed Circular 602-2. Lists all features of each LQ600 pressure class; ASTM, ASME, and military spec numbers of alloy used for bodies and bonnets. 4 pages. *Lunkenheimer Co.*

9—Pipe & Fittings. Here's an 8-pager featuring fabrication techniques and application information on nickel-lined pipe and fittings. Photos of the pore-free, adherent lining. Section, with engineering drawings, on welding procedures in the field. *Bart Mfg. Co.*

MAINTENANCE

10—Pump & Compressor Problems. Two cartoon-sequence bulletins can help you locate and correct common ailments: for rotary, centrifugal, and steam pumps (Bulletin PC-508P); for common air-cooled and water-cooled compressor troubles (PC-509P). 4-pagers. *Worthington Corp.*

11—Service Tools. Big 108-page catalog is loaded with pictures and facts describing 4000 hand and shop tools—including chests and cabs, wrenches and sockets, pulling equipment, tool assortments, and many others. *Snap-on Tools Corp.*

12—Protective Coatings. Tygon protective coatings and related primers are presented in slick 30-page practical work-book. Table in this bulletin (No. 760) gives the chemical-resistance rating of each coating to over 200 corrosive agents. *The U. S. Stoneware Co.*

13—Floors. "Manual on Sweeping and Mopping Floors" is a 24-pager filled with money- and labor-saving tips. It illustrates sweeping and mopping techniques for all types of floors. Another booklet tells you how to remove problem floor stains. *Huntington Laboratories, Inc.*

MATERIALS HANDLING

14—Truck Line. Illustrated 132-page catalog has 5-section index for easy reference on: "riding" electric fork trucks; "walkie" electric trucks; stackers, cranes; handlift trucks, skid platforms; floor trucks, dragline types, and storage racks. *Lewis-Shepard Products, Inc.*

15—Cranes. Pocket-size Crane Operation and Hitching Manual (75 pages) is a handy, practical booklet for users. Contains rules for sound operation, safe hitching practices, and load tables for various slings, shackles, "S" hooks, and eyebolts. *Allis-Chalmers Mfg. Co.*

16—Guided Pallet Conveyors. 28-page brochure (GP-56) has detailed case histories—with in-plant photos in several different types of plants—on applications of guided pallet conveyors. Also a one-pager (1400-56) on vertical lift conveyors. *Rapids-Standard Co., Inc.*

17—Equipment & Services. Illustrated 43-pager (No. 2653) covers handling and power transmitting ma-

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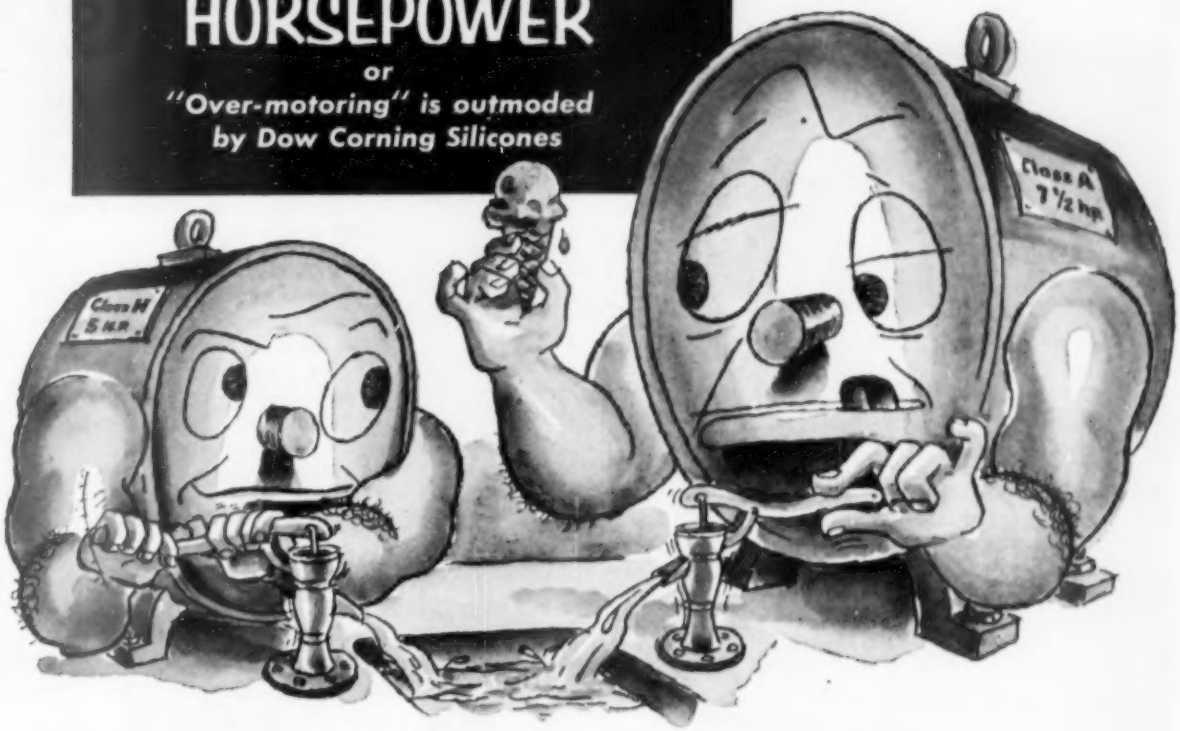
The Case of WASTED HORSEPOWER

or

"Over-motoring" is outmoded by Dow Corning Silicones



SCENE: Pump room, Anyplant, U. S. A.

CHARACTERS: TINY H.—a 5 hp Class H motor insulated with Dow Corning Silicones. BLUSTER A. — a 7½ hp Class A motor.

TINY H: You're goofing-off again! Why don't you try moving a bigger load now and then?

BLUSTER A: Nuts to you, Tiny. I'm working hard enough keeping this little pump going.

TINY H: But you're strong enough to drive a bigger pump . . . or are you?

BLUSTER A: That's enough. I should worry—the engineers who put me here figured I might have to carry a 6 hp load—er—once in a while, at least.

TINY H: Sooo what! I'm rated to match our average load. My silicone insulated innards give me extra muscles to carry any overloads. Why—I could pump a 7 hp load and still be here when you're dead and gone.

BLUSTER A: Shut up, Tiny! Somebody might hear you.

TINY H: Okay, fat stuff, but you can't hide the facts forever. Mark my nameplate—one of these days the boss will figure out how much money you're wasting and you'll have had it.

You can match the load . . .
let Silicones carry the overload

Lazy motors cost money! Why continue to pay a fat premium for motors that make kid's play of their average work load? Today, you can save money by using silicone insulated motors rated to match your average load. Their built-in service factor of 25 to 50% will handle most intermittent overloads or loads that can't be matched in standard frame sizes.

Remember, over-motoring is outmoded

Get sources for silicone insulated equipment—mail coupon today

Dow Corning Corporation, Dept. 5111, Midland, Mich.

Please send me sources of supply for new Silicone (Class H) ☐ Motors ☐ Transformers

NAME _____ TITLE _____

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DOW CORNING SILICONES

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

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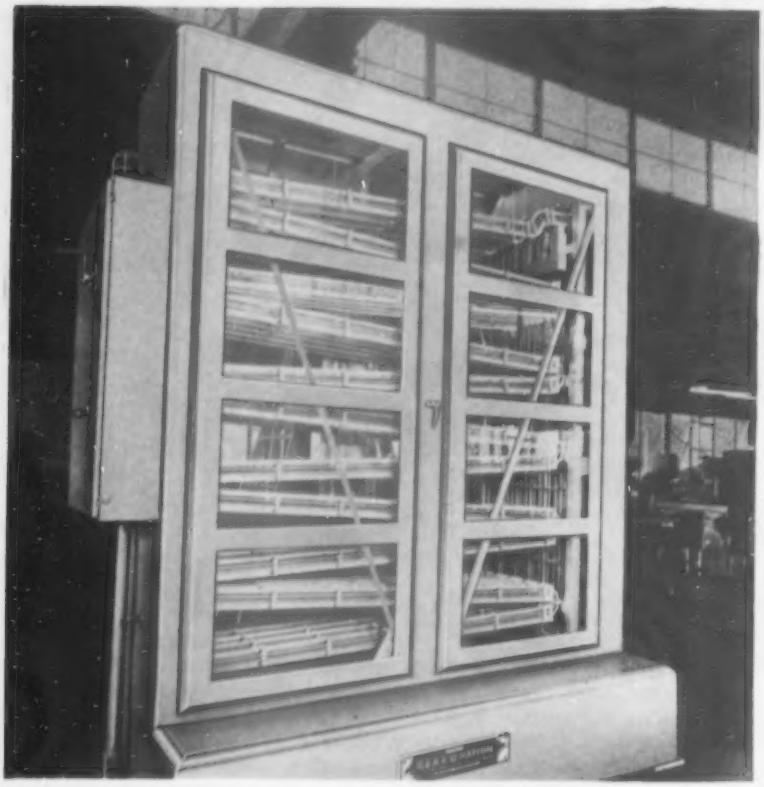
CANADA: Dow Corning Silicones Ltd., Toronto
GREAT BRITAIN: Midland Silicones Ltd., London
FRANCE: St. Gobain, Paris

For more about these products, circle item numbers on Reader Service Card next to back cover.



NO MOTHS IN THIS STORAGE CLOSET. JUST PARTS ELEVATORS AND . . .

Inside Track to Less Downtime

Production stabilizing units—essentially a roller chain elevator and bank of gravity-feed tracks—are designed to supply surge storage between production operations, eliminate complete line shutdown when one machine is down for repairs or retooling. Units will store up to 5000 of any round part (gears, screw-machine blanks), feed them to next machine in the line as fast as it will accept them. Can receive and store parts while following machine is down; continue to feed parts from its storage bank while the preceding machine is down. Thus, within limits, continuous production is guaranteed. Rejects oversize parts. *Michigan Tool Co.* (Circle No. 1, Reader Service Card.)

2—Lead Screw Unit, for fast single or multiple spindle tapping or threading, has continuous-running, unidirectional motor. Two fractional-hp. electric clutches for feeding and reversing; variable torque output for large or small taps. *Warner Electric Brake & Clutch Co.*

3—Noise Reduction Panel, made of low-cost acoustical material, may be easily cut to size—to construct quiet areas in noisy plants, machine enclosures, test rooms, movable barriers, equipment shields, etc. 4x8 ft. or special sizes. Many accessories. *Elof Hansson, Inc.*

4—Power-Speed Control, coupled to portable electric screwdriver, harnesses driver's power for work on delicate materials such as ceramic, plastic, glass. Fragile screws (down to No. 0 size) can be production-driven with driver designed for No. 8's. *Black & Decker Mfg. Co.*

Turn the page

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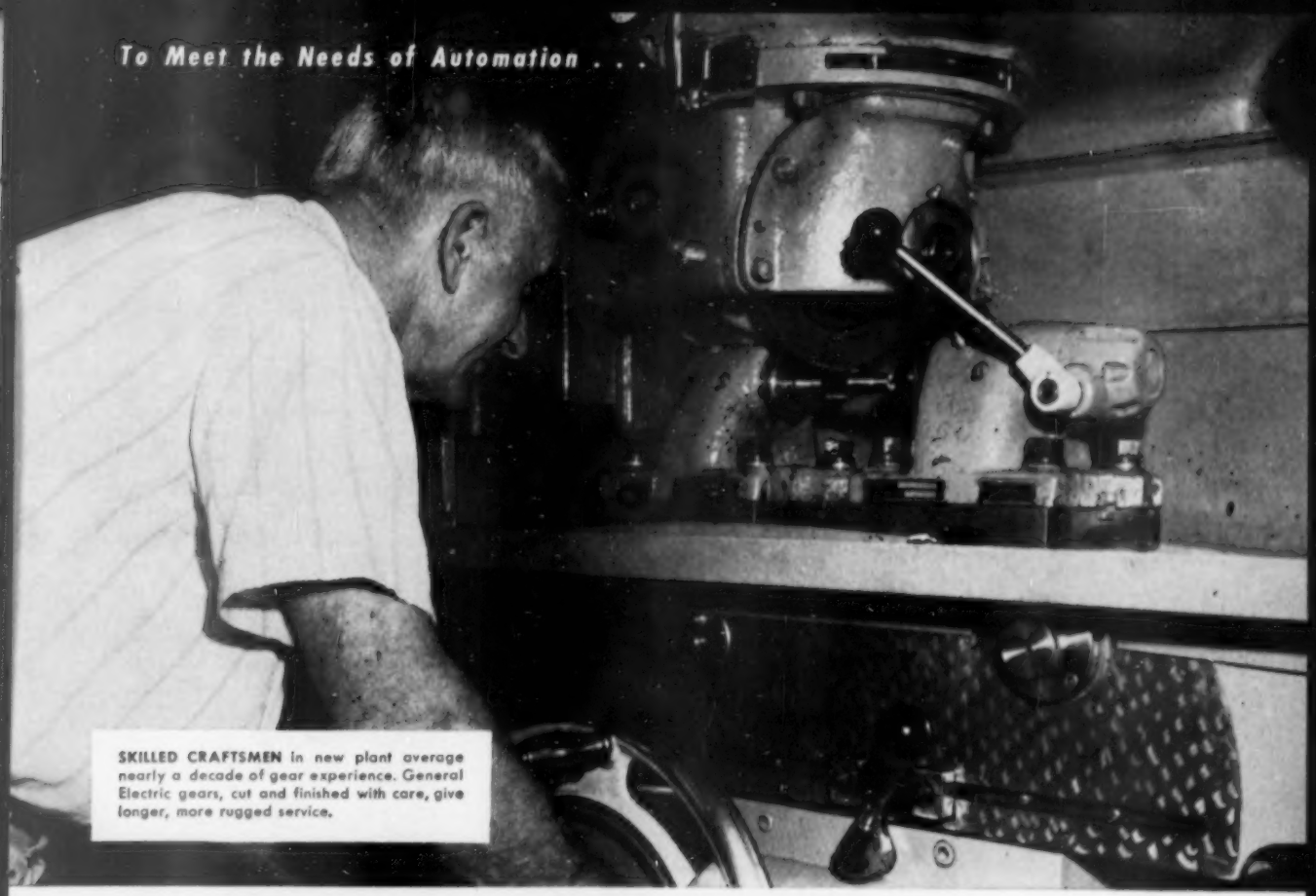
To Meet the Needs of Automation . . .



SKILLED CRAFTSMEN in new plant average nearly a decade of gear experience. General Electric gears, cut and finished with care, give longer, more rugged service.

At General Electric's NEW Gear Motor and Transmission Components Department . . .

3618 man-years of manufacturing know-how assure fast service on low-speed drives

To meet the increased demand for low-speed drives, General Electric's new decentralized Gear Motor and Transmission Components Department will be devoted solely to the design and manufacture of mechanical power transmissions.

•Specialized Attention—Highly trained and experienced gear-motor engineers and skilled craftsmen with over 3600 man-years of experience are available to help solve your low-speed drive problems. They are ready to give you fast, dependable G-E service on standards, on specials, and on new gear-motor products.

•Complete Line Available—General Electric offers a complete line of gear-motors—induction, synchronous, wound rotor, d-c gear-motors—in all types and enclosures, from 1/100 to 200 hp. The new department will also give you rapid service on special needs such as adjustable speed, braking, special mounting or special insulation.

•Fast Service—The expanded gear-motor facilities allow quantity production and shorter manufacturing cycles. Machine tools in the new factory are designed for high volume precision work and are readily adaptable for the production of specials built to your specifications.

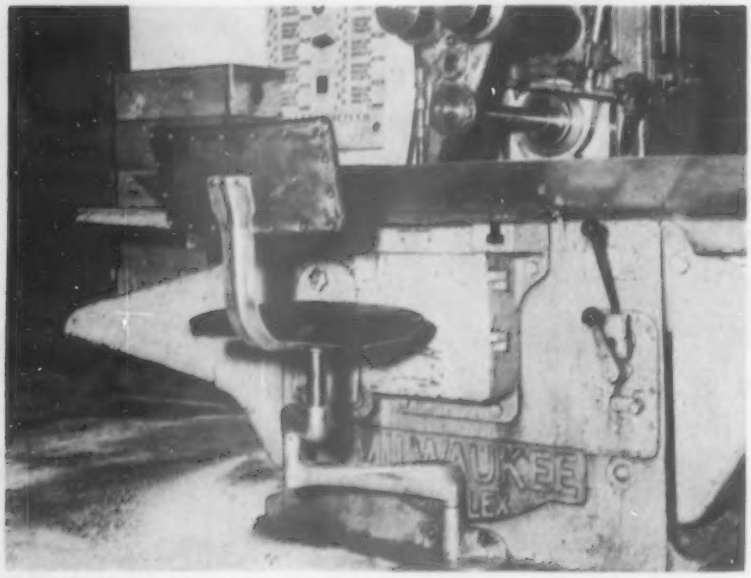
•For More Information—Write for bulletin GEA-6027, Section 851-2, Schenectady, N. Y., or contact your G-E Apparatus Sales Office or gear-motor supplier. Gear Motor and Transmission Components Department, General Electric Co., Paterson, N. J.

Progress Is Our Most Important Product

GENERAL ELECTRIC

CONTINUOUS TESTING provides data for quality control, new designs and developments. Here, an involute measuring instrument records wear, under simulated tortuous conditions, to nearest ten-thousandths of an inch.

QUANTITY PRODUCTION of complete line of G-E gear-motors from 1/100 to 200 hp, in all types and enclosures, assures prompt customer service. Specify General Electric for all your low-speed drive needs.



WORKER CAN SLIDE UP, DOWN, OR AROUND MACHINE USING . . .

Skyhook for Operators

Only hazard in using this new stool is that hardworking operator will develop executive spread. Because he'll be able to reach every part of his machine while remaining seated. "Swivlstool" can be mounted into wood or concrete floor, or direct on machine. Backrest is optional, will swing down behind when not wanted; 2-in. foam rubber seat.

A & A Mfg. Co. (Circle No. 5, Reader Service Card.)

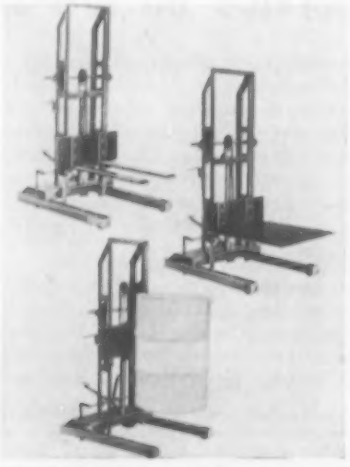
6—All-in-One Air / Lighting Unit doubles as air-conditioning diffuser and fluorescent fixture. Attractively designed units are adaptable to any drop-type ceiling, minimize overhead clutter. Simplified engineering for low initial cost. *Benjamin Electric Mfg. Co.*

7—PEP Transmission System can control industrial processes up to 4000 ft. away. Converts pneumatic signals into electrical impulses for delivery to distant receiver—which operates control elements. *Fielden Instrument Div.*

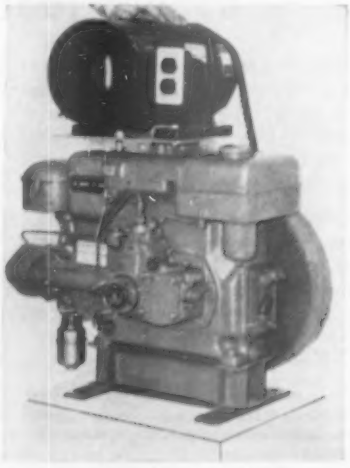
8—Air-Operated Stapler fastens tops or bottoms of *packed* corrugated and fiberboard boxes. And flat cartons may be "set-up" using carton stop members as a post. One stapling head; no electrical connections. *Container Stapling Corp.*

9—Giant Hopper-Feeder, 45 cu. ft., replaces several smaller units—stores and feeds parts through multiple chutes to production machines, assembly lines, etc. Takes rolling parts up to 5-in. dia., 1½-in. long; sliding parts 2-in. dia., 5-in. long. *Feedall, Inc.*

10—Dry Chemical System, when fusible link is melted by fire, automatically pipes dry chemical (under CO_2 pressure) to protect moderate-size hazards—paint-spray, heat-treat, oil-quench, small transformer vaults, etc. Low-cost, 30-lb. capacity. *Ansul Chemical Co.*



11—Lift & Drum Stacker Truck excels for multi-purpose materials-handling use. This low-cost unit combines forks, platform, and drum-handling attachments with hydraulic lift that can be actuated by foot or battery-driven electric motor. *The American Pulley Co.*

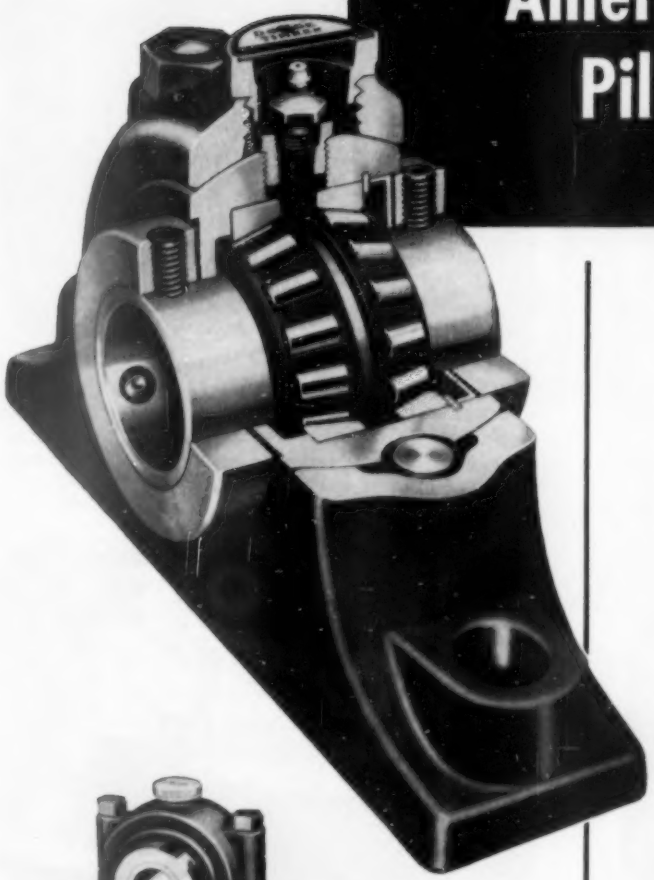


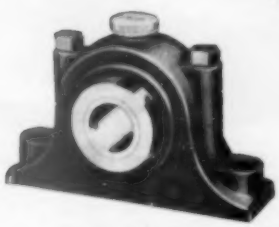
12—Portable Diesel standby power system is a good emergency unit for electric or mechanical power. Burns any type of fuel or stove oil that doesn't require pre-heating; stands indefinitely without changing fuel. *Lynn Engineering Co.*

Turn the page

AVAILABLE IN FIVE TYPES
FOR ALL KINDS OF SERVICE

DODGE-TIMKEN
America's Quality Pillow Block





- COMPLETELY ASSEMBLED
- FACTORY ADJUSTED
- PRE-LUBRICATED

Call the Transmissioneer, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE-TIMKEN Bearings are adjusted, lubricated and sealed at the factory. Labrynth seals effectively retain the lubricant and prevent the entrance of dust and dirt. The inbuilt precision of Dodge-Timken Bearings is protected both on and off the shaft. They are delivered fully assembled, ready to mount.

Where service conditions are toughest Dodge-Timken Bearings prove their quality decisively. For superior performance, dependability and long life they have won their reputation throughout industry as America's quality pillow blocks.

To meet varying service requirements Dodge-Timken Pillow Blocks are available in five types—the type E . . Double Interlock (illustrated) . . Type C . . Special Duty . . . and All-Steel. Available in a range of shaft sizes from 1-3/16" to 10".

Call your Transmissioneer; or write for Bulletin A638 giving load ratings, dimensions and other data on Dodge-Timken Roller Bearings.

DODGE MANUFACTURING CORPORATION
400 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

The Reader Is Boss

or...How ABC Helps You Run The Magazine Business

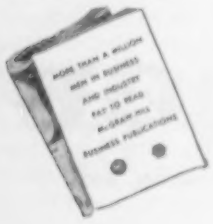
Readers who pay for magazines are always ripe for new ideas, new information, new trends and new technological developments. By giving or withholding their subscription money, reader-customers vote for or against editors and publishers. Counting these "votes" is the important job of the *Audit Bureau of Circulations* – the watchdog of the publishing industry.

YOU CAN TELL which magazines have fully-audited paid circulation when you see the ABC symbol on their cover or contents page. This is the symbol that stands for the Audit Bureau of Circulations, a cooperative organization that sets standards of good business conduct for its publisher members.

ACCURATE FIGURES – ABOUT YOU are the heart of ABC's job. ABC does a candid, unbiased, certified audit of all subscription figures of member magazines – and of the subscribers' jobs, functions, and locations. These audits help editors to tailor the contents of their magazine to your specific job interests.

YOU'RE THE BOSS when you pay money for any magazine. Your vote of confidence and your renewals of subscriptions are dominant in the thinking of editors and publishers. Advertisers are vitally interested, too, and their support helps earn the dollars needed to do a stronger, more useful editorial job for you.

YOU, THE SUBSCRIBER, WIN when you buy ABC magazines, for this mark is your assurance that you are getting a publication tailored to your needs. McGraw-Hill has been a charter member of ABC and has supported its aims continuously for over 40 years. And ABC, in turn, is responsible in many respects for the high standard of business magazine publishing today.



McGRAW-HILL MAGAZINES

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET, NEW YORK 36, N. Y.

FIRST with a COMPLETE LINE OF SAFETY SWITCHES to meet the NEW NEMA STANDARDS

• The table below shows Square D switches meeting new industry specifications. Notice how they clarify conflicting features which existed under old designations. Notice, too, that they establish a new, heavy-duty industrial switch, Type HD.

One important thing which remains unchanged is the **DESIGN LEADERSHIP** which has made **SQUARE D SAFETY SWITCHES** industry's overwhelming **FIRST** choice for more than fifty years. Compare them, feature for feature. They cost no more, why settle for less?

TYPE HD TYPE ND TYPE LD

DESCRIPTION	HEAVY DUTY New	NORMAL DUTY formerly Types H, S, or A	LIGHT DUTY formerly Types D or G
Rating-Ampere Voltage	30—600 250 or 600V AC, DC	30—1200 250 or 600V AC, DC	30—200 250V AC
Enclosure	NEMA 12 • Industrial Use (Gasketed) NEMA 4 & 5 • Water-tight & Dust-tight NEMA 7 • Explosion-resisting Class I—Group D NEMA 9 • Explosion-resisting	NEMA 1 • General Purpose NEMA 3R • Raintight	NEMA 1 • General Purpose NEMA 3R • Raintight
Horsepower Rating	NEC Fuse Ratings Dual-Element Fuse Ratings	NEC Fuse Rating Dual-Element Fuse Ratings	NEC Fuse Rating
Operating Mechanism	Quick-Make, Quick-Break Independent of Handle	Quick-Make, Quick-Break Independent of Handle	Positive Make, Positive Break Spring Assisted
Cover	Interlocked & Padlock Attachment	Interlocked & Padlock Attachment	Padlock Attachment
Plating—Current Parts	Extra-Heavy Silver	Silver	
Endurance	Maximum Endurance Far Exceeds UL Standards	Exceeds UL Standards	Meets UL Standards

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

NEW

THE ONLY

SURFACE GRINDER with a POSITIVE SAFETY SHUT-OFF!

PLUS THESE OTHER COST-SAVING OPERATING ADVANTAGES:

- Handles can be set at 90° or 120° for close corner work and operator comfort . . . another Ingersoll-Rand FIRST!
- A responsive governor insures maximum cutting speed and minimum air consumption regardless of load.
- Single point lubrication, double-sealed wheel bearings, large oil reservoir for long life, low cost operation.
- Top of tool is flat for easy pressure application.
- Available in 2 Models and 4 speeds as follows:

  Speeds: 3100—4100—4500—and 6000 rpm.

  Size 41F with push-locking throttle for constant operation.

  Size 41FX with self-closing, safety type throttle.

Ask for a demonstration of this new safety grinder in your shop.

8-343

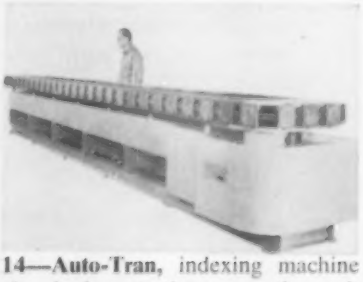
Ingersoll-Rand

11 Broadway, New York 4, N.Y.

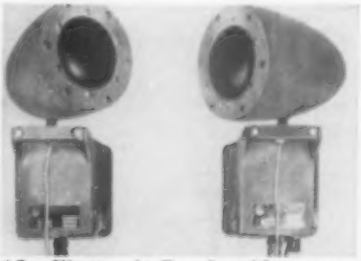
FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

13—Data Processing System automatically measures, monitors, and processes data such as production yields, throughput, and material balances. Features a pinboard programmer, magnetic logic and semiconductor devices, complete floating circuitry plug-in components. *Beckman Instruments, Inc.*



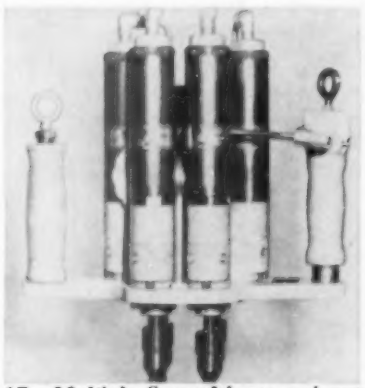
14—Auto-Tran, indexing machine chassis, is a continuous motion unit for processing and manual assembly operations. Unit is 21 ft. long, with 62 carriers (vertical-faced or horizontal) on 9-in. centers; carrier movement from 2 to 8 fpm. *Swanson Tool & Machine Products, Inc.*



15—Electronic Burglar Alarm uses infra-red, modulated light. Two cone-shaped units: one projects "black" light while the other receives signal. Within 900 ft., anybody passing through the beam causes local and/or central alarm to sound. *Walter Kidde & Co., Inc.*

For more about these products, circle item numbers on Reader Service card next to back cover.

16—Clamp Connectors are factory-filled with oxide-inhibiting compound for aluminum or aluminum-to-copper connections that are said to eliminate aluminum joint failures. Lineman just strips seal before installing connector. Many sizes. *Burndy Engineering Co., Inc.*



17—Multiple Screwdrivers and nut setters are designed for torques less than 11 ft.-lb., for multiple driving in the lower torque ranges. Off-set attachment with a 2:1 gear ratio makes it possible to attain up to 27 ft.-lb. of torque from nut setters. *Gardner-Denver Co.*

18—Calking Gun features instant shut-off. A quick twist of the hook at end of the ratchet rod withdraws piston from cartridge to stop calking flow at any desired point. No tools are needed for loading. Gun weighs less than 2 lb. when fully loaded. *Gibson-Homans Co.*

Turn the page

New I-R Torque Control Impactools prove value on auto assembly line

A leading auto manufacturer reports greatly improved *product quality* on 3 auto and truck assembly line operations where Ingersoll-Rand Torsion Bar Torque Control Impactools have been used for 6 months.

A safety hazard is eliminated on one operation, where these new Impactools have made torque control possible for the first time. The photo above shows the I-R Size 5040T Torque Control Impactool securing the steering gear assembly to the truck frame.

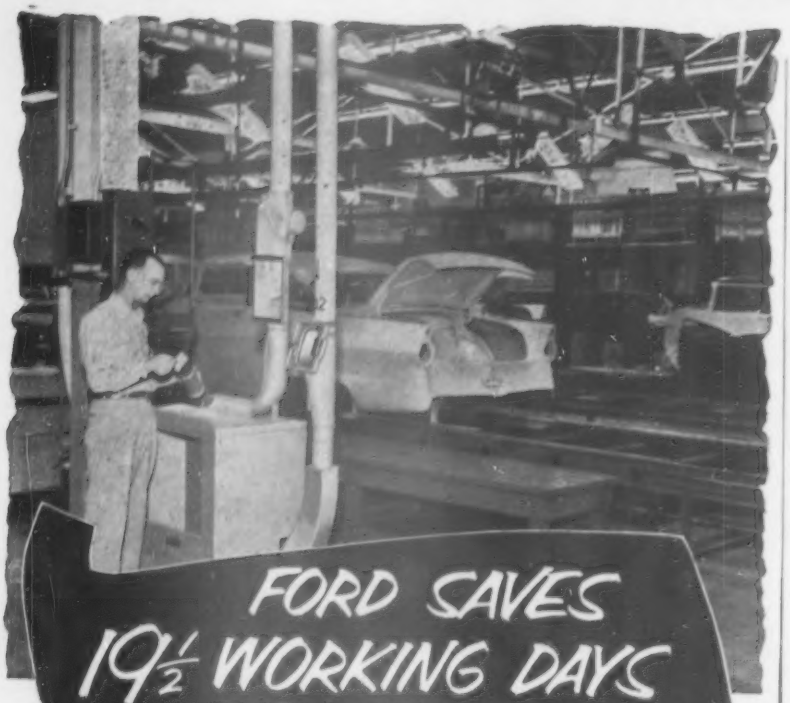
Other major benefits include time saving, because these Impactools operate at full power and speed until they automatically shut off when pre-set torque is reached . . . and elimination of the need for hand [illegible] many nut running jobs.

Size 5040T **2 Torsion bars available with max. torques of 60 and 90 ft. lbs.**

Write for the complete story on this latest I-R development!

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

8-346



FORD SAVES
19½ WORKING DAYS
EVERY DAY

LAMSON AUTOMATIC AIRTUBE SYSTEM
TURNS THE TRICK

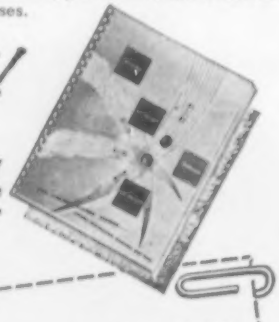
Cards, forms, records—all types of written messages travel between the most distant parts of the big, new Ford plant in Mahwah, N. J. in 2 minutes—the Lamson way. By messenger, the same trip would take 20 minutes.

Assembling 1100 cars and light trucks per day, the Ford Mahwah plant occupies 2,000,000 sq. ft. of space. Each of the 26 stations of the Lamson Automatic Airtube System sends or receives an average of 20 carriers a day. At 2 minutes a trip, carrying time is 1,040 minutes a day. By messenger the same trips would take 10,400 minutes a day. Ford's time saving is 9,360 minutes, 156 hours a day . . . or 19½ working days, every day! And the Airtube System is *always* on the job—*always* covers the distance in the *shortest possible time.*

Lamson Automatic Airtube Systems are quickly installed, with low initial and operating costs. Localized wiring saves time and expense because no wiring leads from a central location. Station controls consist of switch, power unit and deflector. More stations may be easily added as the need arises.

FREE CATALOG!

Read how a Lamson Automatic Airtube System will improve the speed and efficiency of communications in your plant. Write for the 52-page catalog "Airtube on Target."



FOR FREE INFORMATION CLIP TO YOUR LETTERHEAD ▶

Please send me your 52-page catalog "Airtube on Target."

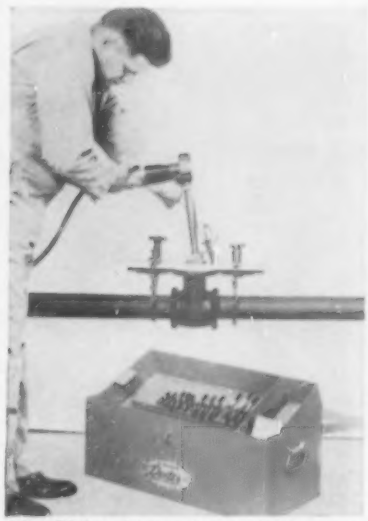
3251

LAMSON

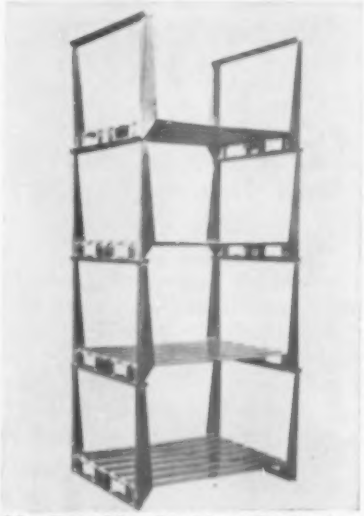
LAMSON CORPORATION
3251 Lamson Street, Syracuse 1, New York
Plants in Syracuse and San Francisco
Offices in Principal Cities

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.



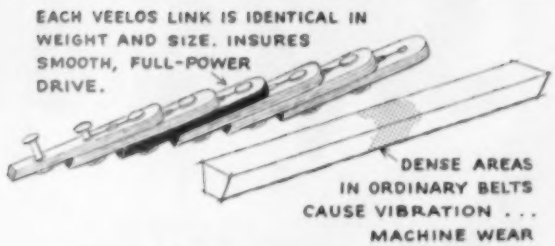
19—Valve Reseating Grinder permits one man to regrind any valve from ¼- to 12-in. right in the line. No crews needed to remove defective valves; no replacement inventories. 3 models, with grinding heads for various sizes of globe or gate valves. *Leavitt Machine Co.*



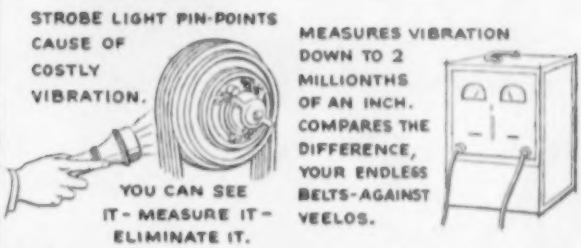
20—Portable Stacking Rack has open sides, providing easy access to stored parts for inventory work; useful for production pick-ups, too. Four steel frame units shown above can easily be moved and stacked—either loaded or empty—by fork-lift truck. *Republic Steel Corp.*

Turn to page 172

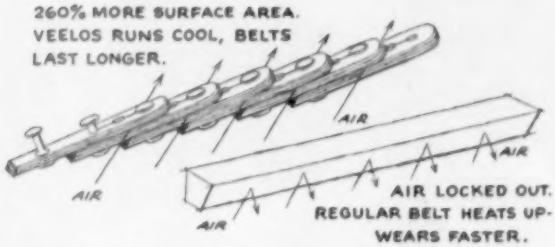
Six Reasons Why Veelos Adjustable V-Belts Are Better For Your Drives!


EACH VEELOS LINK IS IDENTICAL IN WEIGHT AND SIZE. INSURES SMOOTH, FULL-POWER DRIVE.
DENSE AREAS IN ORDINARY BELTS CAUSE VIBRATION . . . MACHINE WEAR

1. Balanced construction of Veelos Belts assures you faster, cleaner work, less rejects . . . less bearing wear. Each link and stud is identical in size and weight. Ordinary belts have varying spots of density which cause excess vibration—chatter marks, machine wear.


STROBE LIGHT PIN-POINTS CAUSE OF COSTLY VIBRATION.
YOU CAN SEE IT - MEASURE IT - ELIMINATE IT.
MEASURES VIBRATION DOWN TO 2 MILLIONTHS OF AN INCH. COMPARES THE DIFFERENCE, YOUR ENDLESS BELTS-AGAINST VEELOS.

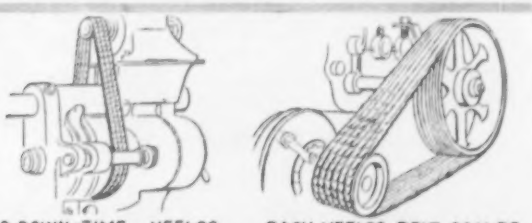
2. Electronic proof—up to 90% less vibration! With a vibration analyzer, you see, on your own machine, how Veelos belts decrease vibration up to 90% over any belt you're now using. This amazing Veelos test pin-points the belt that has the "invisible shakes."



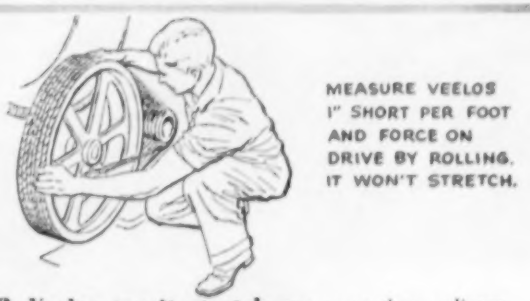
3. Cooler running—long life! Veelos breathes! Constant circulation of air keeps Veelos running smooth. Regular V-belts have no chance to cool, heat builds up from the inside . . . causes slippage, wastes power, heats bearings, reduces belt life.

AREA CONTACT
POINT CONTACT
PERFECT VEELOS FIT. EXTRA THICKNESS AND MACHINE-CUT SIDES PREVENT BOTTOMING. MEAN CONSTANT POWER.
POWERLESS POINT CONTACT OF ORDINARY V-BELT. BULGES, SLIPS, CAUSES UNEVEN SHEAVE WEAR.

4. Greater flexibility reduces slippage! Sectional construction, beveled links allow greater flexibility, longer belt life. Each link moves around sheave independently and maintains full contact, constantly. Full area contact allows shorter centers, smaller sheaves.

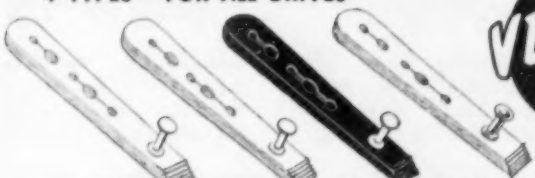

NO DOWN-TIME. VEELOS FITS ANY DRIVE - WITHOUT DISMANTLING.
EACH VEELOS BELT CAN BE ADJUSTED - NO NEED FOR EXPENSIVE MATCHED SETS.

5. Simple installation "knocks out" down-time! Saves up to 50% installation time on outboard bearing drives, more when belt length isn't in stock. No resetting, tilting or moving motors. Veelos can be made any length, can be changed by adding or removing links.



6. Veelos won't stretch any more than ordinary endless V-belts when it is properly installed. *Remember—measure Veelos 1" short per foot and roll on drive as tightly as possible.* With the first few revolutions Veelos studs accept a permanent set into the sections they connect.

4 TYPES—FOR ALL DRIVES



VEELOS
THE BALANCED LINK V-BELT
Known as Veelink outside U.S.A.

For all sizes and types of drives. Double-V available for serpentine drives.

Write for free Veelos Data Book or Veelos Vibration Demonstration to:

MANHEIM
Manufacturing & Belting Co.
403 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

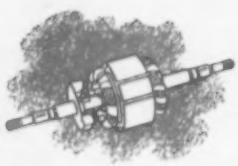
© M.M.&B. Co. 1956

Nothing Like It For "Big Grinder"

SKIL 6"

Why SKIL Model 246 is the Finest You Can Buy:

More safety features at low price! Complete wheel guards, spark arrestors and exhaust chutes.



Fast-Starting statically and dynamically balanced motor gives vibration-free performance. Quiet, cool-running.

Self-lubrication ball bearings give continuous, trouble-free operation—save maintenance time and costs.

SKIL ACCESSORIES THAT GIVE EVEN GREATER SAFETY AND UTILITY!

Features AT LOW COST!

Model 246 Bench Grinder

FOR GRINDING, SHARPENING, BRUSHING OR BUFFING . . . IN ALL PRODUCTION AND MAINTENANCE!

Look at the advantages of this rugged, smooth-running SKIL Bench Grinder. They're usually offered only on bigger, more expensive models. Yet SKIL combines them with outstanding performance and long operating life to bring you the finest light-duty, low-cost grinder you can buy today!

Only SKIL Model 246 Grinder offers all these important big grinder safety features at low price. Wheel guards with end covers, spark arrestors and exhaust chutes, and sturdy, adjustable tool rests. And illuminated eye shields are available as optional accessories for protection and increased visibility.

For safety, for years of dependable, trouble-free service, for all grinding, sharpening, brushing and buffing jobs in the smaller shop. Flat face design permits easier handling of work and lets you reach hard-to-get-at surfaces. Also a favorite for spotting around larger plants to eliminate bottle-necks, save man-hours. Ask your distributor to show you the SKIL Model 246 Grinder now! See for yourself why it's the biggest bench grinder value on the market!

Low SKIL price—Only $58.00

⅓ h.p. 6" SKIL Model 247

Extremely powerful for its size and weight. Has all the safety features and smooth performance of Model 246. For all grinding, sharpening, buffing and wire brush work on production lines, in maintenance and repair shops and tool rooms. **Low Price—Only $68.00!**

Pedestal base for extra convenience! Storage compartment, removable water pot. Optional at small extra cost.

Solid housing of pressure die cast aluminum has maximum strength and rigidity—greater work clearance.

• Illuminated Eye Shield protects eyes, increases work visibility. *Price, $15.00 each.*

• Plain Eye Shield for extra safety! ½" shatterproof glass. *Price per pair, $7.00.*

SKIL PORTABLE TOOLS

Made Only by SKIL Corporation formerly SKILSAW, Inc.,
5033 Elston Avenue, Chicago 30, Ill.
2601 Dundas Street West, Toronto 9, Ontario
Factory Branches in ALL Leading Cities

FREE! **Mail coupon for a demonstration and FREE trial. See why SKIL Models 246 and 247 are the finest grinders of their size you can buy *anywhere* today!**

SKIL Corporation, Dept. FM-116
5033 Elston Avenue, Chicago 30, Illinois

☐ I would like a demonstration and free trial.

☐ Please send literature on SKIL Models 246 and 247 Bench Grinders.

Name_____

Company_____

Street_____

City_____ Zone____ State_____

Cambridge

WOVEN WIRE CONVEYOR BELTS take the "hot spots" out of ANNEALING & BRAZING

FREE CIRCULATION of heat and gases through the all-metal belt and around the work permits continuous, uniform heating and cooling as work moves through your plant.

By combining controlled movement with free circulation of process atmospheres, Cambridge Woven Wire Conveyor Belts eliminate batch annealing and brazing. There is no formation of "hot spots" which produce local stresses. Continuous, belt-to-belt flow through subsequent quenching and washing operations as well as heating, cuts costs and provides fast, uniform production.

NO MATTER WHAT YOU'RE PROCESSING...

. . . metal parts, food products, chemicals, plastics, ceramics, glass . . . or whether your process is wet or dry, at sub-zero temperatures or 2100°F . . . you can increase production and cut operating expenses all along the line by combining movement with processing on Cambridge Woven Wire Conveyor Belts.

Cambridge Belts are individually designed for your installation from a wide variety of specifications. The metal or alloy from which they are woven is specially determined after investigating the resistance to heat or corrosion required by your operating conditions. Uniform, continuous construction minimizes uneven wear, localized weakening and costly shutdowns. Open mesh, also selected to your requirements, cannot trap spilled materials.

Call in your Cambridge FIELD ENGINEER to discuss how you can cut heat treating costs. Look under "BELTING, MECHANICAL" in your classified phone book. OR, write for 130-PAGE REFERENCE MANUAL giving engineering details.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

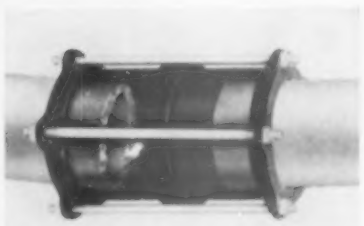
Department E, Cambridge 11, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

21—Pencil-Type Soldering Tool is well suited for rapid production jobs, and repair or corrective work on printed circuit panels. Tapered plastic handle remains cool to the touch. Plug-type tips are ¼-in. diameter. Models for standard voltages. *Vulcan Electric Co.*

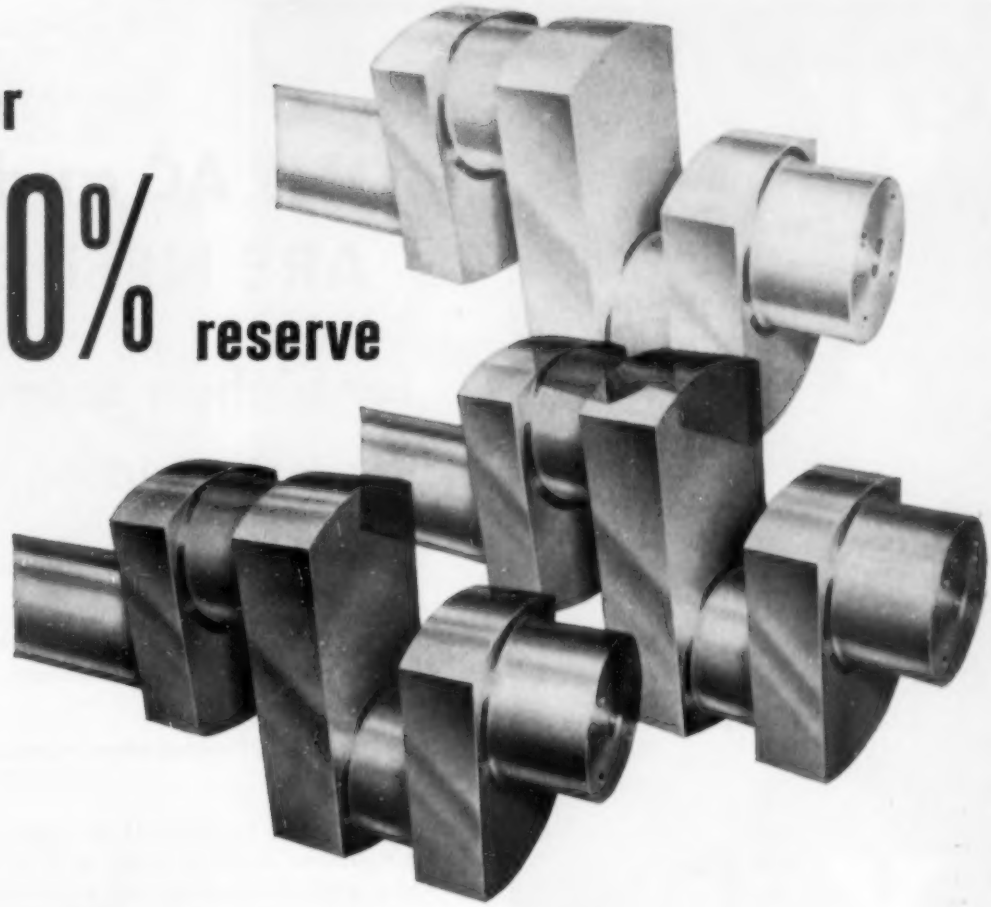


22—Cut-In Coupling, for repairing misalignment breaks in water, gas, or oil pipelines, features a dual sleeve plus a centering ring. Can be used on cast iron, asbestos-cement, or steel pipe; installed with pipe in place. Available in 2- to 12-in. sizes. *Smith-Blair.*

23—Gravity Wheel Storage Rack is suitable for applications requiring frequent changes of package size. Consists of inclined wheel rails mounted in a steel frame; rails slide laterally for quick changes in spacing to accommodate new package sizes. *M-H Standard Corp.*

Turn the page

Over 300% reserve



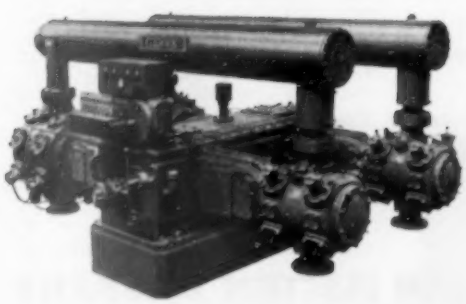
Built in the Crankshafts of many Clark Balanced/Opposed Compressor Models

Extra-heavy crankshafts are standard equipment on Clark Balanced/Opposed compressors . . . it's brought about by standardization.

All models of a particular stroke size have the same bearing and crankshaft diameter. As an example, the number one crankpin of all CMA models is capable of transmitting with complete safety 600 BHP. The CMA-2 rated at 150-300 BHP and the CMA-4 rated at 350-500 BHP therefore have a tremendous reserve. The same thing applies to the 14" and 17" stroke CRA and CBA models.

Rugged shaft construction assures maximum bearing life and minimum maintenance. It also eliminates the need for a bearing between opposing cylinder crankthrows which would double the force couple between opposing cylinders and in turn increase shaft stress and foundation requirements.

Your nearest Clark representative will be pleased to give you all the facts on the original Balanced/Opposed compressors, or write for bulletin 118.



CLARK 350 BHP BALANCED/ OPPOSED AIR COMPRESSOR

CLARK BROS. CO., OLEAN, NEW YORK
One of the Dresser Industries
Offices in Principal Cities Throughout the World

CLARK **Balanced/Opposed Compressors**

When one welder gives both AC and DC...

Handles every type of electrode...

Yet costs less to buy and operate...

WHY

shouldn't you be using IDEALARCS for your production welding?

BOTH AC and DC ARE NEEDED

for highest speed... lowest welding cost

The trend in welding is towards larger diameter electrodes . . . higher currents.

This calls for more and more use of AC welding.

WITH this trend to larger electrodes and heavier currents, many welding jobs done today with DC welding will eventually be done with AC.

As a result, only a welding machine that can deliver AC as well as DC current will best handle both your present and future welding needs.

Idealarc is this kind of welder.

You can buy Idealarc as an AC/DC welder or as a straight AC machine to which you can add DC at any time.

So why compromise . . . why own and operate separate AC and DC machines when one welder . . . Idealarc . . . gives you maximum benefit in speed. quality of welding and low cost.

Write for Bulletin SB-1343 for facts.

THE LINCOLN ELECTRIC COMPANY

Dept. 3714 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment.

For more about these products, circle item numbers on Reader Service card next to back cover.

24—Press, for metal-powder compacting, extends range of part sizes and shapes that can be produced—such as double counterbore or double hub shapes—without additional tooling. Model 300-H is a 300-ton, hydraulically operated unit. *Baldwin-Lima-Hamilton Corp.*

25—Mobile Tank Unit is for transporting and dispensing coolants, hydraulic and cutting oils or solvents. Easy one-man-handling. Mounted on 12-in. rubber tire or 30-in. steel wheels; 80-gal. capacity, either hand- or electric-operated 15-gpm. pumps. *Coolant Equipment Corp.*

26—Centrifugal Compressors, ranging from 200 to 2000 tons, are used in comfort and industrial process air conditioning. These are overhung type with two stages, balanced back-to-back impellers and diffusers, adjustable inlet guide vanes. *Surface Combustion Corp.*

Turn the page

● IN 2 EASY STEPS

Just dip, then rinse. Rust, paint, primer are all removed.

THE CHOICE IS YOURS!

the obsolete method	the TURCO method
1. Hot tank alkaline stripping and degreasing.	1. Dip for rust and paint removal.
2. Rinse	2. Rinse
3. Acid dip for rust removal (acid resistant tank).	3.
4. Rinse	4.
5. Alkaline neutralizing	5.
6. Rinse	6.
7. Dry	7.

These steps no longer necessary

● WITHOUT ACIDS

Eliminates hazards encountered with acid de-rusting materials.

Here's a new concept in the removal of rust from metals. Turco Alkaline Rust Remover strips the heaviest rust, along with paint and primer . . . and does it *all* in one simple 2-step operation! Heavy rust and multiple paint layers usually require only a few minutes immersion. Slightly pitted rust normally yields to Turco Alkaline Rust Remover in less than a minute.

Non-acid Turco Alkaline Rust Remover contains no cyanide compounds . . . creates no corrosive fumes. Moreover, it will not affect dimensional tolerances, cause hydrogen embrittlement or any of the other hazards so commonly encountered with acids.

Just dip and rinse, for *complete, safe* and *quick* rust removal. One of many reasons why, when it comes to *chemical processing,* America's leading plants turn to Turco . . . *first!*

TURCO

TURCO PRODUCTS, INC.
Chemical Processing Compounds
6135 So. Central Ave., Los Angeles 1, Calif.
Factories: Newark, Chicago, Houston, Los Angeles
Offices in all Principal Cities

Write for full details on Turco Alkaline Rust Remover. There is no cost or obligation.

Please affix coupon to company letterhead
TURCO PRODUCTS, INC.
6135 S. Central Ave., Los Angeles 1, Calif.
Please send me full details on Turco Alkaline Rust Remover without cost or obligation.
NAME _____
TITLE _____
EM

Stanley Heavy Duty Drills

" . . . and power to spare!"

"What I like about these new Stanley all ball bearing drills is the way they stand up on the tough jobs, day after day, week after week. They do all the drilling we take them to with complete satisfaction and power to spare."

This is what one typical user has said about Stanley 300 series *heavy duty* portable drills. For rugged maintenance of all kinds and for production that demands continuing peak performance, it's what every user knows.

See for yourself. Try each of the 4 models listed below. Rate them on your own experience with electric drills. Ask your industrial distributor salesman to take one down and show you the guts of the tool — the *Stanley-made* motor. These are drills you can buy and use with complete confidence.

Chuck Size	Model Number	Price	Chuck Speed No Load	Chuck Speed Full Load	Capacity Steel	Capacity Wood	Length	Net Weight
¼"	324	$47.00	2000	1100	¼"	¾"	11⅜"	5¼ lbs.
¼"	328	56.00	1500	800	¼"	1"	11⅜"	6 lbs.
5/16"	334	58.00	1000	500	5/16"	1⅛"	11¾"	6 lbs.
⅜"	338	60.00	850	500	⅜"	1⅛"	12¼"	7¼ lbs.

Call your industrial distributor today. For complete industrial Catalog No. 56, write Stanley Electric Tools, Division of The Stanley Works, 34N Myrtle St., New Britain, Connecticut.

STANLEY

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

27—All-Steel Truck, 1½ tons, is a low-cost British import—the Oppermore Motocart. Truck is powered by a single-cylinder 4-cycle air-cooled motor; is said to operate on 1½-gal. of gas per 8-hr. shift. Body bed is 17 in. from ground; easy dumping. *Linden Equipment Corp.*

28—Forming & Finishing Tool is useful for a wide range of industrial jobs. Two models (one shaped and used like a hand plane; the other like a rasp) for all materials up to the hardness of mild steel, including wood, rubber, leather, plastics. *The Stanley Works.*

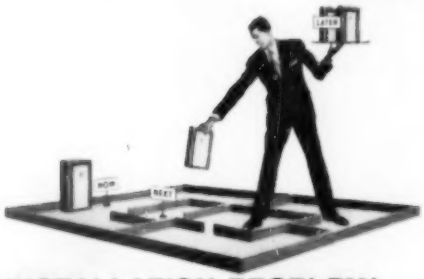
29—Purifier is installed in low-pressure steam lines on exhaust side to remove oil, pipe scale, and other impurities before steam is returned to boiler. Cleans steam without moving parts, filters, or mesh screens, using two-stage separation process. *V. D. Anderson Co.*

Turn to page 177

General Electric's new ZONE-BY-ZONE method makes

AIR CONDITIONING FOR INDUSTRY

more efficient, more economical to install, to operate, to maintain



NO INSTALLATION PROBLEM!

No more shutdowns or extensive alterations when you install air conditioning! General Electric's Zone-by-Zone idea of Air Conditioning makes it possible to install units without serious work interruption. No heavy initial outlay, either. You can install step-by-step, a zone at a time—expand as your budget and convenience permit.

NO FINANCING PROBLEM!

Air Conditioning costs less than you think! General Electric will work out a convenient financing plan to suit your budget. Whether you install a zone (or unit) at a time—or do the whole job at once, you may take 3 years to pay—in large installations, longer, more flexible terms available.

NO SPACE PROBLEM!

No matter how pressed you may be for space, compact General Electric Air Conditioning Units present no problem. Ceiling-mounted models available for areas where there is no floor space to spare. They take no floor space! Floor-mounted units may be stationed *away* from zones being served.

NO WASTED COOLING!

Each General Electric Unit is individually controlled—and that means no wasted cooling. You control your air conditioning same way you control electric lighting. No need to cool a whole plant if only a section is in use.

NO MAINTENANCE PROBLEM!

These compact units are self-contained. Cooling system sealed by flame to keep dirt and moisture out, vital refrigerant and oil in. Each unit operates independently—no remote parts to cause maintenance problems. Each unit carries General Electric's unsurpassed 5-year warranty covering parts and labor against repair and replacement bills on the vital sealed cooling system.

2 GREAT TYPES TO CHOOSE FROM

1. CEILING-MOUNTED UNITS. Completely self-contained, take no floor space. Air-cooled or water-cooled.

2. FLOOR-MOUNTED UNITS. Smartly streamlined, quiet, durable and trouble-free. Can be stationed in space or out of space.

NOW IS THE TIME TO BUDGET FOR GENERAL ELECTRIC AIR CONDITIONING!

Ask your consulting engineer to contact a General Electric Contractor about Zone-by-Zone Air Conditioning for your plant. Call today—or write GENERAL ELECTRIC Co., Commercial and Industrial Air Conditioning Department, 5 Lawrence Street, Bloomfield, N. J.

Progress Is Our Most Important Product

GENERAL ELECTRIC

GENERAL ELECTRIC ANNOUNCES

static switching systems

General Electric's new static switching systems have been designed to increase significantly the dependability and life of control equipment where frequent operations, complex systems, and continuous processes are required or atmospheric problems exist.

These new G-E systems utilize static-magnetic and solid-state devices to perform a variety of control functions normally accomplished by contact-making devices. Static switching systems consist of varied combinations of seven basic units: an isolation switch unit, two multi-purpose units, a long time-delay unit, a short time-delay unit, an "AND" unit, and an "OR" unit. These units can also be combined with static power supplies, static amplifiers, and static regulators to provide completely static control systems.

Where frequent operations are involved, static switching systems are ideal, as they have no moving parts to wear.

Where complex control functions are required, the simplified circuitry of the static switching systems makes them particularly applicable.

For continuous processes, these systems assure dependability through the use of pre-tested, industry-proved static components.

Unaffected by most atmospheric conditions, the static units are encapsulated in an inert, lightweight compound.

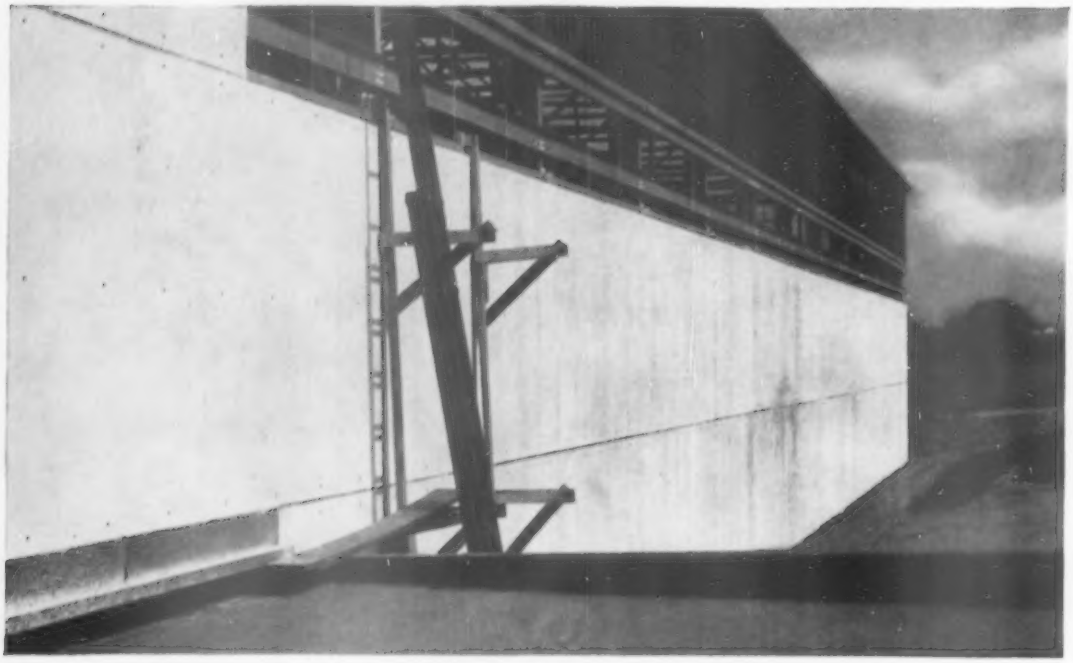
General Electric control engineers are ready now to help you apply the benefits of static switching systems to your machines or processes. For additional information, contact your nearest General Electric Apparatus Sales Office, or write for Bulletin GEA-6364 to Sect. 785-2, General Electric Co., Schenectady 5, New York. *Industry Control Dept., Roanoke, Virginia.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

CAT. NO.

Johns-Manville TRANSITOP® Structural Panels meet the trend to modern panelized construction



Transitop Panels offer maximum coverage... minimum erection cost

THE MOST striking change in building construction methods in recent years has been the trend toward prefabricated building panels.

This is particularly true in the construction of panelized curtain walls for buildings, large and small. Although curtain wall construction in skyscrapers has been widely publicized, this method of construction is just as applicable to smaller buildings such as schools, hospitals, office buildings, motels and shopping centers. Today, paneled curtain walls probably exceed all other applications in popularity and are rapidly becoming the standard method of building construction.

Johns-Manville Transitop offers architects, designers and builders a simple and economical method of providing panelized curtain walls. Transitop is durable, weather resistant, requires minimum maintenance. As a curtain wall, Transitop provides high structural strength, reduces the dead load, increases usable floor space, provides adequate insulation and is easy to erect. Panels are easily applied over wood or steel framing.

The same advantages that make Transitop so suitable for panelized curtain wall construction also make it equally ideal for roof deck construction.

J-M Transitop is a complete 4′ wide by 8′, 9′, 10′, or 12′ long unit, in 1⅛″, 1⅛″, 1⅝″, or 2″ thicknesses. It consists of an integral impregnated insulating board core faced on two sides with Asbestos Flexboard® sheets.

- Facings of tough, weatherproof asbestos-cement Flexboard
- Core of integrally impregnated insulating board
- Waterproof adhesive bonds core to Flexboard sheets

- Transitop is cut to fit and installed with ordinary construction tools

For information on Transitop, write Johns-Manville, Dept. FM, Box 158, New York 16, N. Y.

JOHNS-MANVILLE PRODUCTS

Johns-Manville

For more about these products, circle item numbers on Reader Service card next to back cover.

30—"Airgrit" marks fine, delicate parts during continuous production line assembly without interrupting operations. Permanently reproduces inspectors' symbols, codes, OK's, rejects, and designs on machined, glazed, or polished surfaces. *Jas. H. Matthews & Co.*

31—Machinery Mount speeds installation and relocation of all types of equipment, reduces vibration transmission, lowers noise levels. This adjustable-level mount can be used anywhere under machines without fastening to machine or floor. Low cost. *Korfund Co., Inc.*

32—Variable Speed Drive is for register-control applications (in printing, packaging, textile, and plastic industries, for example). Accurate enough to eliminate, in many cases, error sensing and correction systems. Mechanical or electrical control. *Graham Transmissions, Inc.*

Turn to page 180

AUTOMATE YOUR METAL CLEANING!

...Call On DETREX

Eliminate slow and costly manual handling and keep your metal cleaning processes in step with production.

Detrex Engineers have years of experience in the design and manufacture of quality automatic equipment . . . degreasing — washing — phosphate coating. Let this experience provide you with modern, automatic metal cleaning built right into your conveyor lines.

Also, Detrex Ultrasonic Soniclean Process has been incorporated into many continuous production lines.

Mail the coupon for complete information on Detrex equipment, or check your Sweet's Plant Engineering File.

☐ I am interested in automating my ____degreasing ____washing operation.
☐ Please send literature on standard Detrex equipment.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

Dept. A-817

DETREX CHEMICAL INDUSTRIES, INC.
BOX 501, DETROIT 32, MICHIGAN

DEGREASERS • DEGREASING SOLVENTS • WASHERS • ALKALI AND EMULSION CLEANERS • PHOSPHATE COATING PROCESSES

No
PLUNGER ELECTRIC
installation
is too
large

NEW BOOKLET

Booklet A-414 describes the NEW Otis Plunger Electric Freight Elevator designed for low-rise, light and heavy duty freight handling requirements. We'll be glad to send this booklet to you.

BETTER ELEVATORING IS

ELECTRIC • PLUNGER ELECTRIC

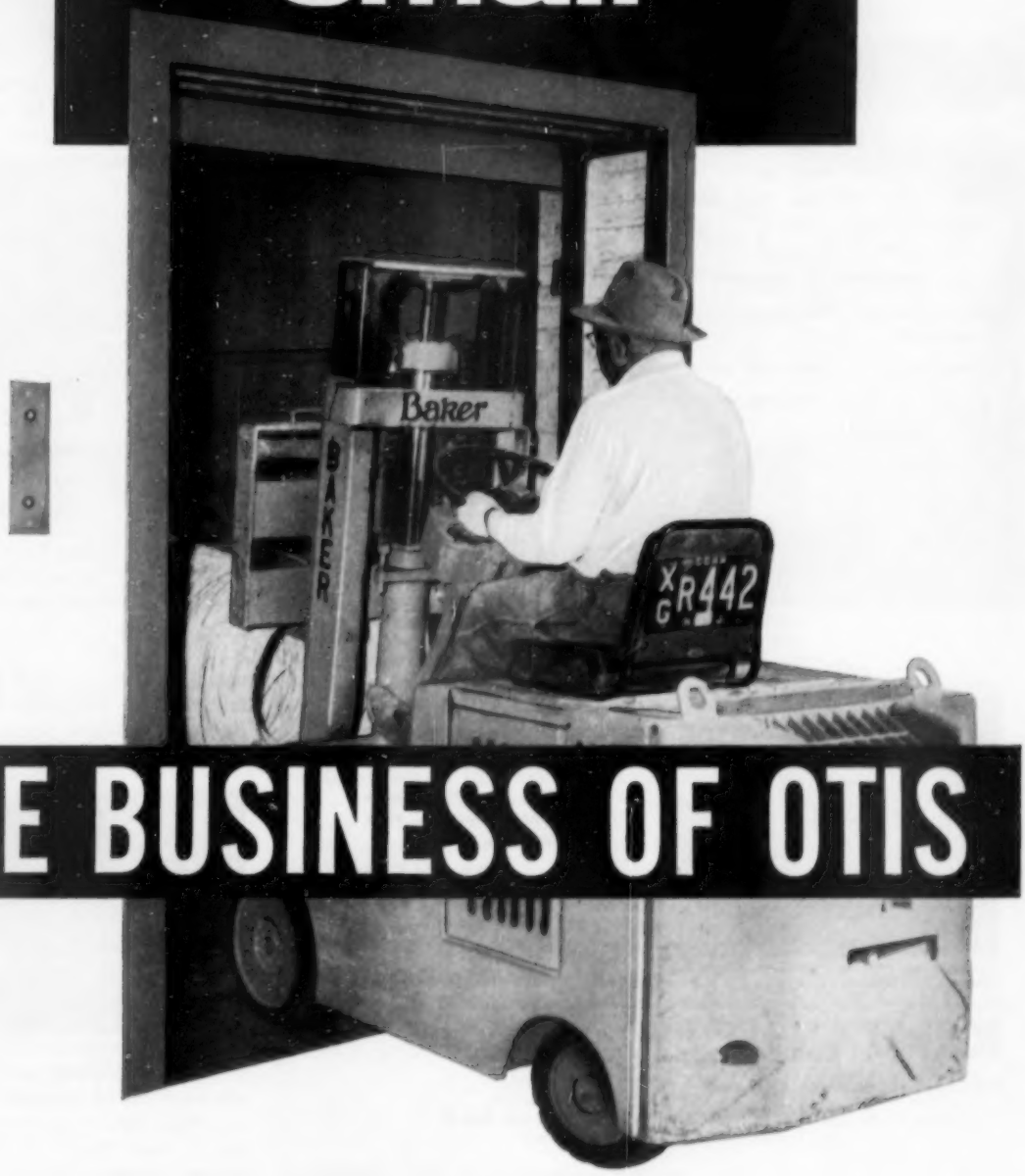
freight elevators

LIGHT, GENERAL, AND HEAVY DUTY

ELECTRIC DUMBWAITERS

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

No
PLUNGER ELECTRIC
installation
is too
small



THE BUSINESS OF OTIS

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

An offset eye may mean nothing to you, but an offset motor could cut floor maintenance costs for you.

The exclusive Kent floor machine design cuts labor costs up to 18.9% over center-mounted and divided-weight machines.

KENT EXCLUSIVE FEATURES:

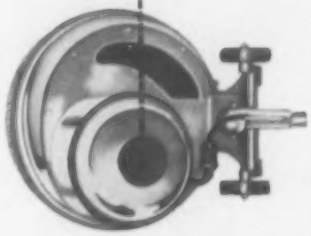
Balanced Power . . . minimizes torque, offsets handle weight

Floating Power . . . "Cushioned" gears

"Power" Steering . . . fingertip control

Only 2 Gears

Fully Enclosed Motor . . . no dust, no dampness



Offset motor means Balanced Power

Imperfect balance and torque—sidewise pull of the brush—make ordinary floor machines hard to operate. Kent's exclusive offset motor counterbalances handle weight and minimizes torque . . . means less fatigue, faster work. All weight is evenly distributed on the revolving brush—longer wear, fewer service problems.

Kent's famous cleaning team uses a Kent industrial vacuum cleaner—for wet or dry pickup.

Cuts costs 18.9% more than competitive Floor Machines.

MAIL COUPON TODAY!

KENT Company, Inc.

456 Canal Street, Rome, New York

Yes, I want to cut maintenance costs! Send full details on your line of floor machines vacuums.

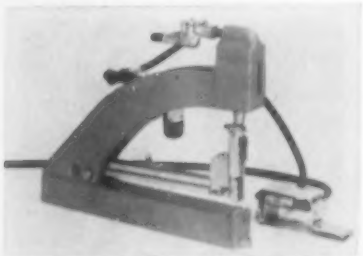
Name.....

Address.....

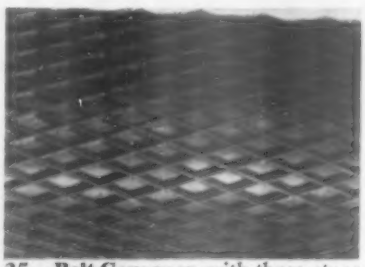
City.....State.....

For more about these products, circle item numbers on Reader Service card next to back cover.

33—"Sound Catcher" is recommended for noisy factory areas where sounds can't be reduced at source or isolated from adjoining areas. Pyramid-shaped acoustical unit (aluminum outer sheet, backed by 2-in. fiber blanket) hangs from ceiling on wires. *U. S. Gypsum Co.*

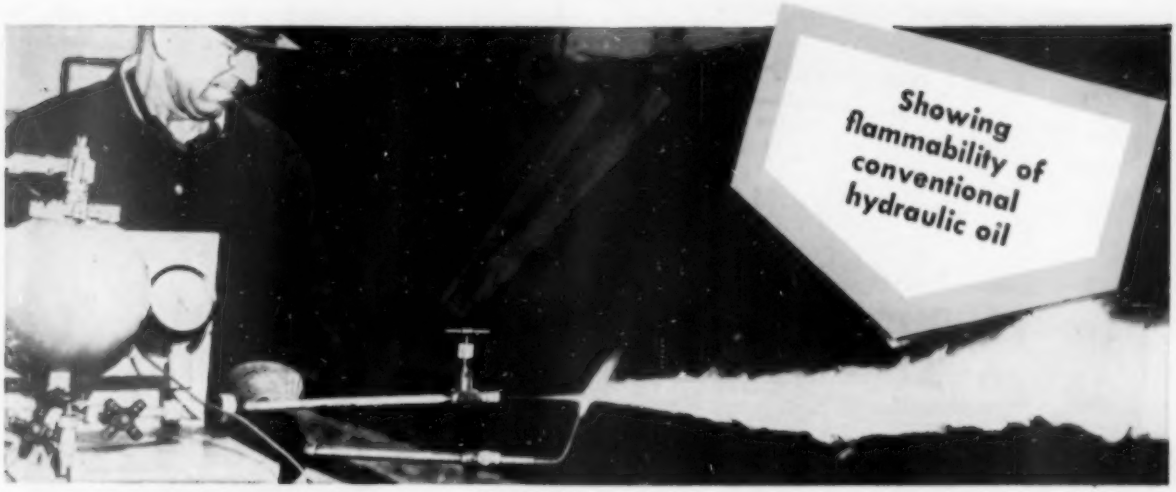


34—Bench Stapler, for a variety of stapling tasks, features an air-drive unit that can be triggered by either hand or foot. For high-production jobs, two or three of these machines can be set up to work as a single unit. Easy to change heads and staple sizes. *Bostitch.*



35—Belt Conveyor, with three-stage design, has gripping power to handle all types of packages from cans to rough cloth bags on inclines up to 45 deg. Made of abrasion-resistant rubber compound in square edge slabs, and in widths up to 60-in. *Goodyear Tire & Rubber Co.*

Turn the page



Flame tests prove its fire-snuffing ability

SHELL
IRUS
FLUID 902

Entirely new formula: Shell Irus Fluid 902 is a special formulation . . . product of three years' development and field testing. It is suitable for nearly all industrial hydraulic systems, as a direct replacement for presently used oils. *Here is a fire-resistant hydraulic fluid that can be widely used.*

Non-corrosive: Shell Irus Fluid 902 contains no corrosive ingredients. It has no harmful effects on seals, fittings or bearings. It does not promote rust.

No major modification necessary . . . simply clean present fluid thoroughly out of system and replace directly with Shell Irus Fluid 902. You can use it with complete confidence. Write for test data and all information.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

You've Got A Date In November at the

22nd NATIONAL EXPOSITION of POWER & MECHANICAL ENGINEERING

(Under auspices of ASME)

NOV. 26-30, 1956
In New York's New Coliseum

You and your key men have a date at one of the most important exhibitions of power progress anywhere, anytime. For many executives, production men and engineers, it will be the most profitable five days of the year. Every aspect of power—its production, its use, new techniques, new economies will be on view in hundreds of exhibits (including Atomic Energy) in the country's newest showplace—the Coliseum.

There is no more effective and profitable way of keeping up-to-date on what's new and different in the power field than to attend this exposition. And there is no more comfortable place to see it in than the new Coliseum.

Plan now and act now—write for advance registration for you and your key men to:

22ND NATIONAL EXPOSITION OF POWER & MECHANICAL ENGINEERING
480 Lexington Ave., New York 17, N. Y.

MANAGEMENT: INTERNATIONAL EXPOSITION COMPANY

3508

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

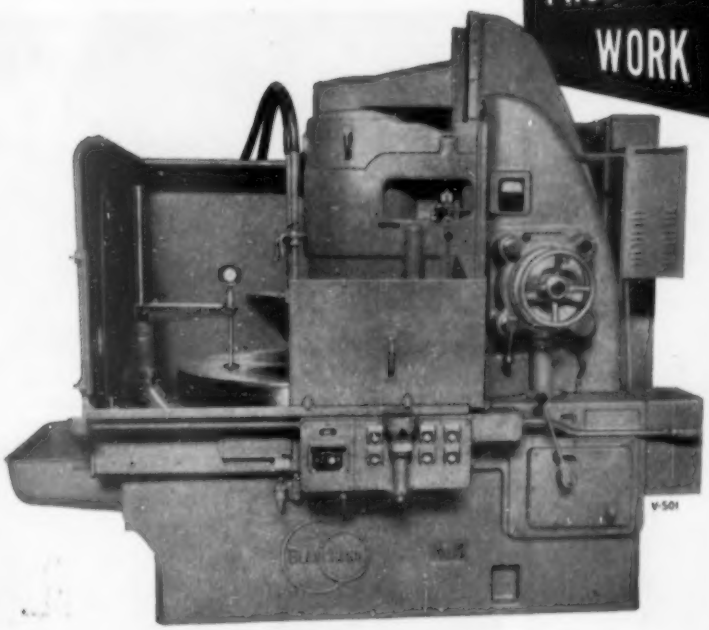
36—Drill Press, 20-in., combines adaptability of a power tool with capacity of a machine tool (1-in. dia. holes in cast iron, ¾-in. in steel). Also a 15-incher for production line and maintenance jobs. Both sizes available in many low-cost models. *Rockwell Mfg. Co.*

37—Shelving is simple to assemble and rearrange for flexible storage use. Basic unit consists of base and top shelf, back panel, and two end panels. Shelves, as needed, slide in and out easily; can be raised or lowered without removing dividers. *Frick-Gallagher Mfg. Co.*

38—Mercury Lamp, 1000-watt, has interior phosphor reflector that directs two-thirds of light downward. It's for medium and high mounting in industrial installations. Is said to cut costs 15% for a given lighting level. Rated at 53,000 lumens. *General Electric Co.*

Turn to page 186

for BEST results in surface grinding...
PUT IT ON THE BLANCHARD

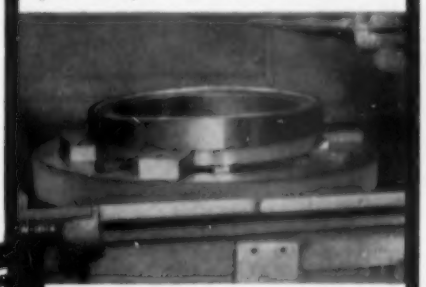


PRODUCTION WORK

SIDE PLATES. 9" x 18" plates ground from rough on No. 18 Blanchard with 36" chuck. Stock removal 1/16" to 1/8" per side. Held flat within .003", parallel to .001", and to dimension tolerance of ±.001". Production: 30 surfaces per hour.

CONNECTING LEVERS. Cast iron levers ground in special magnetic fixture with pins located in "vee's". Stock removal per side is 1/32" to 1/16"; must be flat and at right angles to pins. No. 18 production: 180 pieces per hour, compared to 20 pieces per hour by former method used.

MAINTENANCE AND ODD LOT WORK



HARDENED STEEL PUNCHES. This 24-13/16" dia. punch, reground on a No. 18, is centered radially on 36" magnetic chuck. Duplicate circumferential and radial shear reliefs are generated with two setups.

GRANITE SURFACE PLATES. A No. 18 Blanchard reconditions this 18" x 34" granite surface plate by grinding it flat within .0002". 3/16" of stock is removed in 5 hours.

Blanchard Grinders are used throughout industry on surface grinding jobs that demand the utmost in production, finish and accuracy.

Whatever *you're* surface grinding, there's a Blanchard designed to do the job speedily and accurately.

PUT IT ON THE **BLANCHARD**

Send for free copies of "Work done on the Blanchard", fifth edition, and "The Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE COMPANY
64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

AIM* for packaging

INSULATION: Semi-automatic machine applies compression
—Idea No. S6-3

BRICKS: Steel strapped brick saves time and labor
—Idea No. S3-17

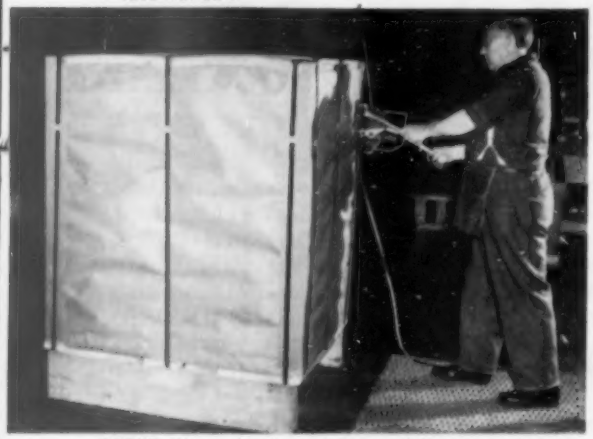
KD BOXES: Steel strapping makes neat, easily handled bundles
—Idea No. S2-2

TRUCK PARTS: Packages made quickly with steel strapping
—Idea No. S1-4

LUMBER: Steel strapping speeds handling, reduces damage
—Idea No. U2-2

benefits with ideas-in-action

MILLWORK: Steel strapping machine bundles millwork
—Idea No. S2-7



PAPER: Heavy loads steel strapped for secure shipping
—Idea No. S3-10

Packaging the Acme Idea way can mean important benefits to you through pleased customers, safe secure packs, protected shipments and labor-material economies. Your *Acme Idea Man has available for you hundreds of in-use Acme Steel Strapping ideas for better packaging and shipping . . . ideas with which others are enjoying dollar-saving benefits.

The Ideas-in-Action on these pages are representative of many available for adaptation and application to your particular packing and shipping operation. Ask your Acme Idea Man to review his Ideas-in-Action files with you. And he's ready to apply his training, experience and steel strapping know-how to your packaging problems without cost or obligation.

Contact your local Acme Idea Man at the nearest Acme Steel office. Look for it under "Steel Strapping" in your classified directory, or send the coupon below for full information.

ask your *Acme Idea Man about packaging benefits

ACME STEEL STEEL STRAPPING

Valuable free Steel Strapping and Unitizing Books are yours for the asking. Each details dozens of ways Acme Idea Men have pointed out better packing and shipping methods through use of Acme Steel tools, materials and ideas.

Acme Steel Products Division,
ACME STEEL COMPANY, Dept. FAS-116,
2840 Archer Avenue, Chicago 8, Illinois

Please send the new Acme Steel ☐ Steel Strapping Catalog ☐ Unitizing Bo
☐ Have an Acme Idea Man call

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

CM Lodestar®

FEATURING:

- Push Button Control
- Ultra-Modern Regenerative Electric Braking
- Self-Adjusting Heavy Duty Magnetic Brake
- Sealed-in Lifetime Lubrication
- Overload Protection
- Fully Enclosed Components
- Lowest Headroom
- "CM-Alloy" Flexible Link Chain

CAPACITIES: from ⅛ to 1 ton. Single and 3 phase. ¼ ton model weighs only 51 pounds.

$149.50 and up
F.O.B. Factory

Built to serve you without costly maintenance

Lodestar is the first truly "heavy duty" version of the small electric hoist. The CM Lodestar is designed to operate without costly maintenance or interruptions in your work schedules. The initial cost is practically your only cost with a Lodestar... an extremely low cost indeed!

WRITE US or call your CM distributor for literature, prices and quick delivery from stock.

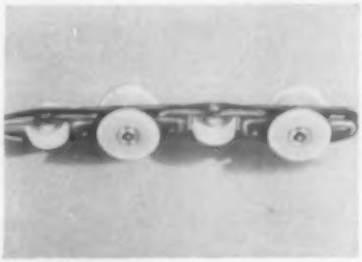
CHISHOLM-MOORE HOIST DIVISION
Columbus McKinnon Chain Corporation
Tonawanda, New York
REGIONAL OFFICES: NEW YORK • CHICAGO • CLEVELAND
In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario

CM HOISTS AND CHAIN

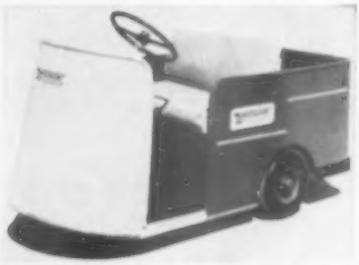
FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

39—Wire Racks are lightweight and strong for transporting components from one processing unit or machine station to another. And collapsible for easy, compact storage. Wire formations in shelves can be shaped for particular products being handled. *E. H. Titchener & Co.*



40—Nylon Wheels on overhead conveyor chain need no lubrication. Wheels, with stainless steel bearings, suit many materials handling applications—especially where there's water or high humidity. Quiet; resist organic solvents, alkalis, acids. *Richards-Wilcox Mfg. Co.*



41—Electric Car, for in-plant service, boasts low initial and operating cost. Is 30 in. wide, 74 in. long; has ¼-ton cargo capacity; sharp turning radius. Powered by four heavy-duty automotive batteries; three speeds forward and reverse. *West Coast Machinery, Inc.*

Turn the page

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

here's the way to BOOST PLANT CAPACITY on a limited budget

In thousands of plants, all over the country, engineers and maintenance men are making their equipment more automatic and more productive by installing MICRO SWITCH precision switches. These switches are famous for their space-saving size, dependability, rugged housings and easy installation.

Plant production is increased at the very minimum of cost. As machines are made more automatic, operators do more and better work. Work is done more quickly under the safer conditions that protective switches provide. MICRO SWITCH interlocks save costly machines, dies and materials from damage.

This multiplication of plant work capacity through the use of MICRO SWITCH precision switches is easily done. Products of MICRO SWITCH, a division of Honeywell, are readily available. They are sold by authorized distributors in key cities everywhere.

Why not put new life into your present plant equipment? Look under "Switches, Electric" in the Yellow Pages for the name of the distributor near you. For technical assistance on switch problems, call MICRO SWITCH Engineering Service at the nearest branch office.

Any of these catalogs will be sent on request

62 "Basic Switches" • 65 "Micro Switch Trip Control"
73 "Toggle Switches" • 74 "V3 Switches"
75 "Subminiature Switches" • 83 "Industrial Enclosed Switches"
90 "Mercury Switches" • 101 "Switches for Industry"

HOW MUCH IS A NEW PRODUCTION IDEA WORTH? MICRO TIPS DIGEST IS FULL OF THEM—WRITE TODAY

Problem—*To shut off motor when oil supply is low.*

Solution—Two HONEYWELL Mercury switches were attached to float in oil reservoir. When re-filling is needed first switch lights a warning light. If level becomes dangerously low, second switch shuts off motor.

Problem—*to stop needle breakage in knitting machine.*

Solution—Two metal-enclosed MICRO SWITCH precision switches were installed at upper and lower limits of knitting machine. They shut off current if thread breaks either above or below the cone.

Problem—*to avoid broken band saw blades because of improper tension.*

Solution—A MICRO SWITCH metal-enclosed switch is located on sliding sleeve at upper band saw wheel. When sleeve, which indicates tension, travels beyond danger point, switch turns on warning light.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

Take a look at your finishing method — will Automatic Painting pay off?

Here's how to find out...in advance

Before you invest a cent in equipment, DeVilbiss will put your product or component part through a series of trial runs on already-installed automatic spray equipment. The results of these trial runs in the fully equipped DeVilbiss Laboratory will determine the actual unit rate production, material consumption, film build attainable and over-all quality of the finish. Thus, you'll know in advance what economies, if any, can be derived by setting up new facilities or converting your present operations to a fully proved DeVilbiss system for completely or semi-mechanized spray finishing.

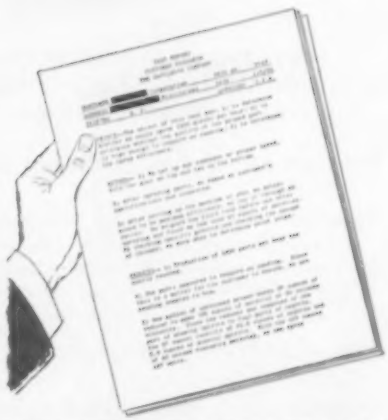
THE DEVILBISS COMPANY • Toledo 1, Ohio

Santa Clara, Calif. • Barrie, Ontario • London, England

Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY

DEVILBISS



YOU GET A FULL TEST REPORT

1. Without obligation, the DeVilbiss representative will survey your problem, secure production data and the finish requirements.
2. In the DeVilbiss Customer Laboratory, a trial run will be set up on automatic transverse, rotary, or chain-on-edge spray painting equipment.
3. Test results are sent to you. You'll know in advance if painting your product automatically is practical and economical.

We'd like to help you. Call our nearest representative or write us direct. The DeVilbiss Company, Dept. 318, Toledo 1, Ohio.

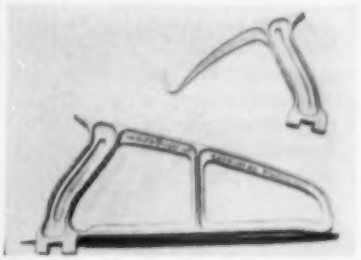
For more about these products, circle item numbers on Reader Service Card next to back cover.

42—Work Rubbers are high, wide, and handsome enough. They'll slip over wide-last safety shoes equipped with steel toe caps. High tops protect against splashes—a boon to workers amidst oil, grease, chemicals, acids. Lightweight neoprene; easy to clean. *Tingley Rubber Corp.*

43—All-Weather Cab, for maker's gasoline tractors, has many desirable attachments: hot-water heater, defroster, electric windshield wiper, head and tail lights, directional turn signals. All-steel, 12-gage body for mounting on user's tractors. *Mercury Mfg. Co.*

44—Pneumatic Recording Controller controls and records both pressure and temperature. Type 57 is for pressure ranges from 0-5 to 0-5000 psi.; temperature ranges from –350 to +1200 F. Type 58 just records, in the same ranges. 6-, 9-, or 12-in. charts are available. *A. W. Cash Co.*

45—Flexible Drill Shaft makes it possible to drill, file, or ream in confined places that can't be reached with an electric drill. Short shaft, with ½-in. core and ½-in. shank that's easy to insert in drill chuck. Permits use of cut-off or broken drills. *Stow Mfg. Co.*



46—File Handles convert ordinary files into convenient, plane-like cutting tools—ideal for machining, lathe work, tool and die making, and pattern making. Made of durable cast aluminum, in two sizes to fit any size or make of mechanic's file. *E. V. Nielsen, Inc.*

47—Automatic Dockboard is designed for simplified pit construction, reducing installation costs. Positive safety stop prevents dock falling when truck pulls away; two arms for smooth operation. Truck-actuated, counterbalanced ramp above is recessed model. *Kelley Co., Inc.*

Turn to page 192

Take a new look at your electric bills!

Are they hiding the price of a new air compressor?

An air compressor that runs well can fool you into thinking that it works well, too. Fact is, it may be "running" your compressed-air costs way out of proportion because it has lost its efficiency. And that means you're paying for a *new* compressor through higher electric bills!

DeVilbiss air compressors in horizontal or vertical models, ½ to 15 hp.

If that's the case, you'll be money ahead to change to a DeVilbiss compressor that, by actual test, delivers up to 22.6% more air per power dollar than most others.

For full data, ask your DeVilbiss jobber for the DeVilbiss Compressor Catalog. Phone him today!

THE DEVILBISS COMPANY

Toledo 1, Ohio

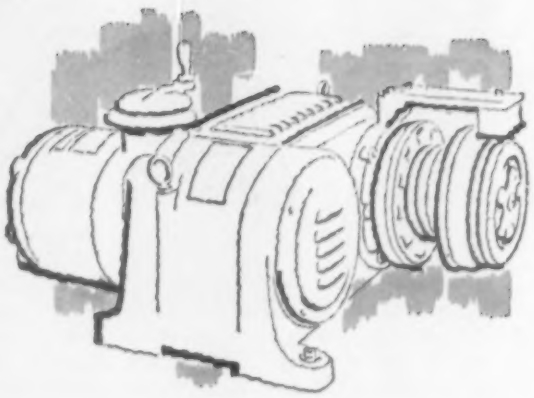
Santa Clara, Calif.
Barrie, Ontario
London, England

DEVILBISS

Branch Offices in Principal Cities

WARNER ELECTRIC BRAKES & CLUTCHES MAKE ALL MACHINES MORE PRODUCTIVE

More speed, more flexibility, more of the profit-making control features you want in your plant!



These examples show how easily Warner Electric Brakes and Clutches can be installed . . . singly or in combination . . . on a pulley, gear, or chain drive to hold back obsolescence and increase the productivity and efficiency of many machines in your plant.

The proved success of *electric motion control* for industrial machinery is the result of *close integration* of the actuating method (pushbuttons, relays, limit switches, electric eyes, and other automatic controls) with the operating principle, or mechanism. This provides instantaneous response and instantaneous switching from a brake to a clutch for precise control of simple or complex machine functions. Only 6 or 90 volts of d-c will energize the magnet and produce complete, positive engagement. Operation of two or more units can be synchronized accurately by pre-setting a rheostat in the control panel.

Don't wait to replace your present machines with the newest models before you take advantage of this new control method. Call your Warner distributor for application assistance and complete information about electric brakes and clutches for high- or low-torque drives.

Brake magnet (B) is secured to bearing housing at take-off shaft (A). Brake armature (C), driving sheave (D), and clutch magnet are secured to steel quill (G) by individual taperlock bushings. Clutch armature (F) is mounted to hub secured to shaft by taperlock bushings. Drive pulley can be started and stopped electrically, while motor operates continuously under load or no load.

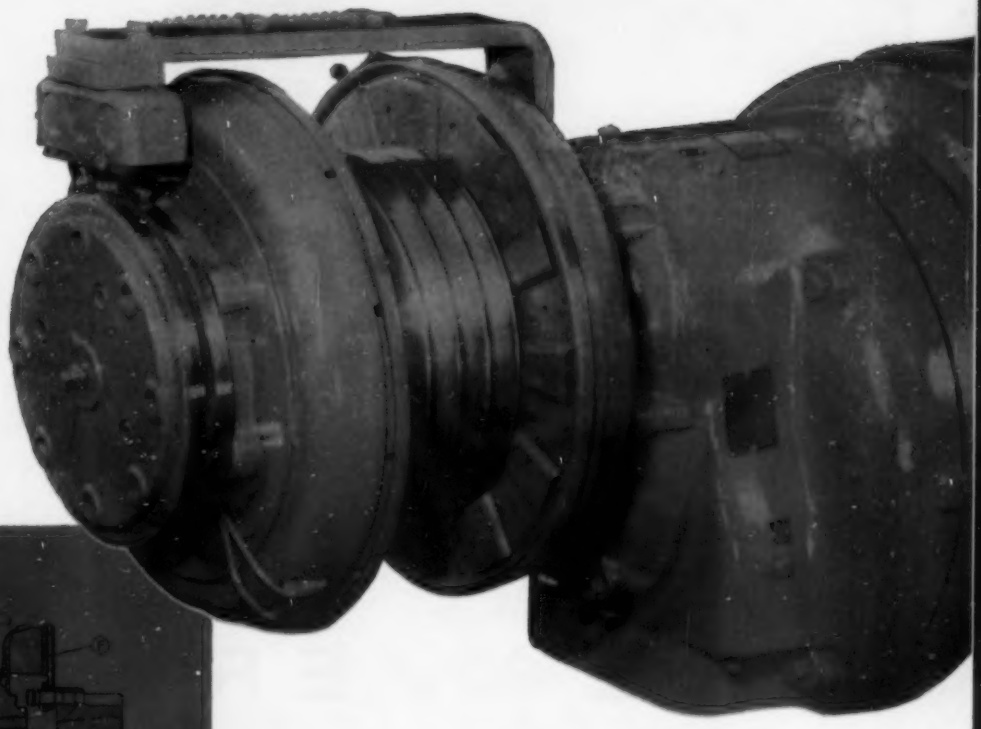
EASILY SOLVE PROBLEMS LIKE THESE

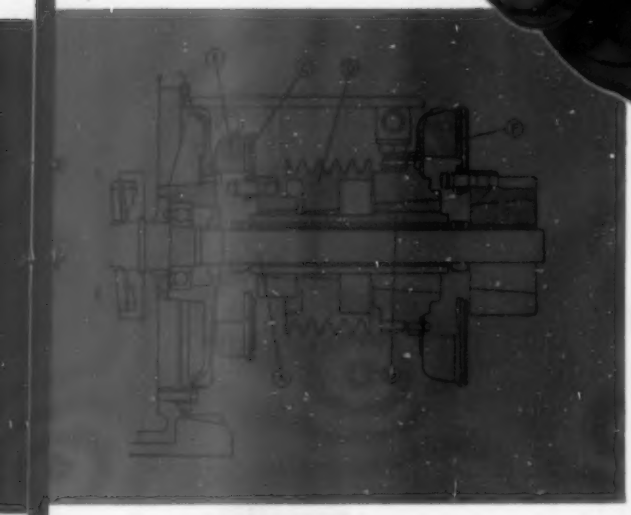
Clutch-brake on driven shaft—Brake magnet is stationary mounted to support bracket—brake armature is mounted to inside hub, keyed to driven shaft. Clutch armature is mounted on drive pins to a free-running sheave. Clutch magnet is keyed to driven shaft. Inching and instant starts and stops are now possible on this textile machine, with increased production and no stop marks on the finished fabric.

Clutch-brake mounted to driving cam—Drive motor runs continuously. Brake magnet is stationary mounted to outboard bearing bracket of pulley assembly. Armature floats on drive pins set in clutch magnet mounting hub, which is keyed to the shaft. Clutch armature is mounted on drive pins to free-running sheave. Automatic cycle actuated by foot switch, is now 600 per hour.

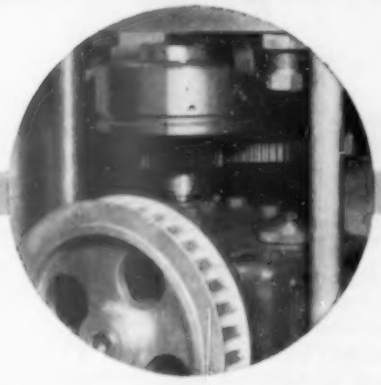
Clutch-coupling and brake—Clutch coupling is mounted on continuously running drive shaft between motor and gear reduction unit. Brake armature is keyed to driven shaft and brake magnet is stationary mounted on outboard support bracket. Fast, repetitive starts and stops can be made without stopping or changing motor speed. Accuracy and productivity are increased.

Warner Clutch-Brake assembly allows the motor to run continuously in this variable speed drive. More accurate inching and jogging are now possible, and torque of clutch-brake is infinitely variable.





Warner electric motion control offers smooth, automatic power transmission. There are no teeth to engage or wear out (or clash!) and no sliding yokes, levers, or complicated linkages. Full engagement is possible in *milliseconds*.



Clutch bearing mounted in feed box—Fractional horsepower clutch is bearing mounted at right angle to gear reduction unit on shaft geared to sprocket drive. Operation is synchronized by rheostat adjustment with clutches controlling other machine functions. Production has been increased from 12 per minute by hand to 110 per minute by this "Warner-equipped" machine.

WARNER

Beat competition with

ELECTRIC BRAKES AND CLUTCHES

Warner Electric Brake & Clutch Co.,
Dept. FMM, Beloit, Wisconsin

Please send me my copy of your new Condensed Catalog No. 6212.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

THE NEW

BEAVER Porto-Mite Super Drive

THE WORLD'S LIGHTEST 4-LEGGED POWER DRIVE!
TREMENDOUS POWER AND RUGGEDNESS!
WEIGHS ONLY 84 POUNDS!

● A one-man unit with four-legged stability . . . gears lubricated for life . . . lighter but more rugged . . . entirely new throughout . . . faster, more powerful, completely new greatly improved motor . . . quick-acting Power Grip Wrenchless Chuck . . . positive grip forward and reverse . . . instant and accurate, easy setting rear guide eliminates double chucking . . . motor and switch fully protected . . . all parts accessible for minimizing upkeep and maintenance . . . power to spare to drive geared tools up to 12" . . . smooth, streamlined, polished aluminum housing.

Get all the facts about the New Beaver Porto-Mite Super Drive. Write for Bulletin No. PM 55 Now!

THREADED PIPE
It's Tight—It's Best—Costs Less

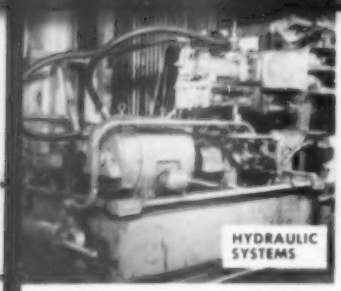
BEAVER PIPE TOOLS
226-400 DANA AVE. • WARREN, O., U. S. A.
"55 Years of Highest Quality"

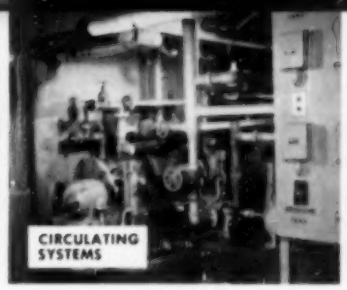
For more about these products, circle item numbers on Reader Service card next to back cover.

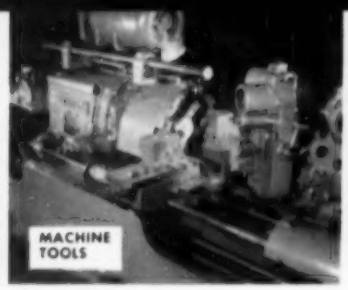
48—Telescopic Platform, for interior or exterior repair and maintenance, can be stopped and locked in position at any height from 9 to 40 ft. Hydraulic, 500-lb.-capacity lift unit is one-man-operated, easily retracted for rolling between jobs. *Allied Mfg. & Sales Co.*

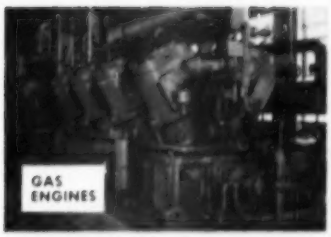
49—Motorized Hardness Tester has many uses for specification and production-control processes. Semi-automatic, high-capacity Model Y features a short test cycle; has an illuminated dial gage, indenter light. Runs on 110 volt a-c power. *American Chain & Cable Co., Inc.*

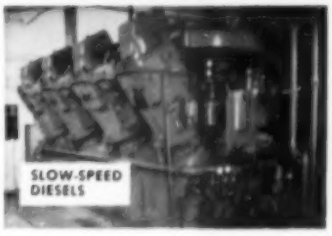
Turn the page











SUN SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

Moderately priced...low in carbon-forming tendencies, Sun Solnus® oils simplify your storage problems by doing with *one oil* many jobs that would otherwise require *several.* Their ability to protect metal parts against corrosion, their resistance to oxidation, and their moderate price all add up to "more lubrication per dollar."

For technical information, see your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-51.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

© SUN OIL CO.

In Canada: SUN OIL COMPANY LIMITED, Toronto and Montreal

Valve on left is from compressor run for 3,000 hours with well-known, high-grade oil. At right is same valve after a 3,000-hour run with Sun Solnus oil. Note difference in carbon deposits.

3000-HOUR TEST PROVES SUN SOLNUS OILS REDUCE CARBON BUILD-UP IN COMPRESSORS

Equipment: A three-stage Norwalk horizontal-type compressor. Operating pressure: from 1,000 to 1,500 psi.

Test: The compressor was cleaned thoroughly and filled with a well-known, high-grade oil. The equipment was run for 3,000 hours, then torn down for inspection and cleaning. Then Solnus® 300 was tested in the same way.

Results: Look at the two pictures. You can see for yourself how Solnus oil reduced dangerous carbon build-up.

All types of reciprocating air compressors that have been changed over to a Sun Solnus oil show similar results. A test in your compressor will show the same remarkable reduction of carbon deposits.

You can get a technical bulletin about Sun Solnus oils by asking your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-52.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

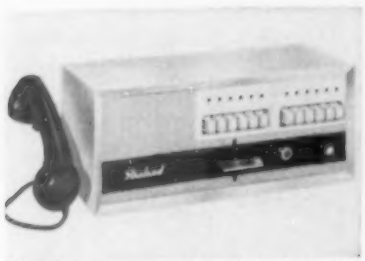
SUN OIL COMPANY PHILADELPHIA 3, PA.

© SUN OIL CO.

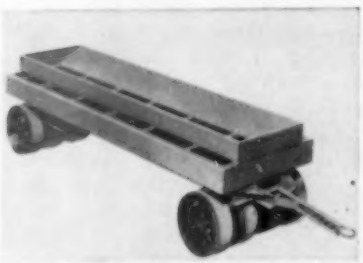
IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

For more about these products, circle item numbers on Reader Service card next to back cover.

50—Portable Belt Conveyors, for loading and unloading trucks and freight cars, expand up to 17 ft. to reach into vehicles from docks. Two 16-in.-wide models: 26-footer expands to 43 ft., carries distributed load of 4000 lb.; 15-footer to 25 ft., 1000 lb. *The Colson Corp.*



51—Intercom System features station signal lights and chime signal; calls remain registered and identified during absence of person signalled; facilities are available for up to 30 buttons and lights. Many models for industrial intercom and paging. *Raulang-Borg Corp.*

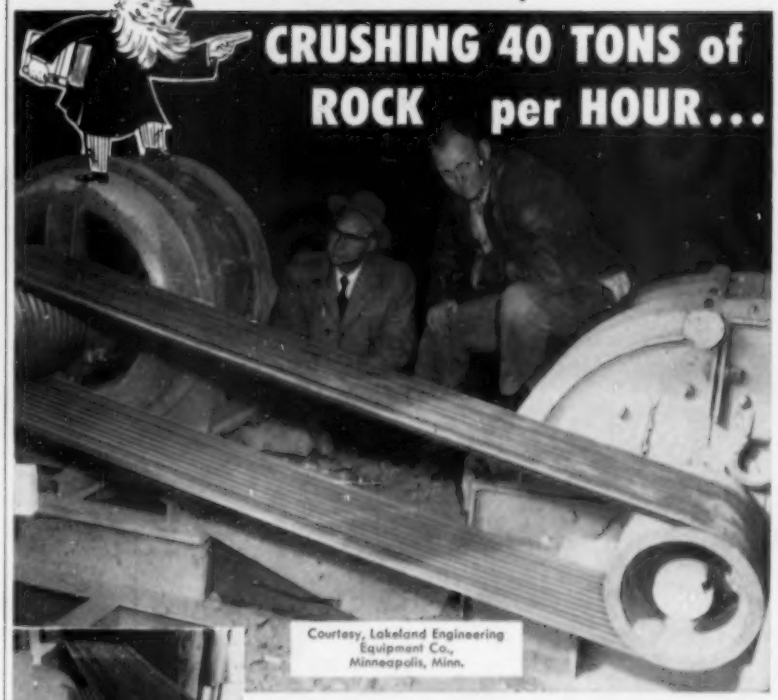


52—Heavy-Duty Trailer is designed for easy handling of heavy loads in the plant. Heavy fabricated steel construction, all-welded, either fifth wheel or caster type. Built to customer's specifications, including platform height and capacity. *Palmer-Shile Co.*

Turn the page

The Little Professor says:

CRUSHING 40 TONS of ROCK per HOUR...



Courtesy, Lakeland Engineering Equipment Co., Minneapolis, Minn.

This vertically balanced set of 12 Durkee-Atwood heavy-duty V-belts at the Ochs Plant, is typical of Durkee-Atwood matched belt installations. D-A belts are matched vertically . . . there's no "sag" error . . . each belt is tested individually . . . that's why D-A guarantees matchability.

Calls for rugged, *Power Balanced* DURKEE-ATWOOD V-BELTS!

Demanded by Ochs Brick and Tile Company of New Ulm, Minnesota is long belt life from the multi V-belts used in their heavy-duty crusher. That's why their plant superintendent, Don Schrepfer (at right in photo) selected Durkee-Atwood vertically balanced and matched V-belts . . . to keep brick production at 25,000,000 per year . . . serving building needs throughout North Dakota, South Dakota, Minnesota, Wisconsin, Illinois and Iowa.

Mr. Schrepfer's supplier, Oscar Ulrich (at left in photo), of Lakeland Engineering Equipment Co., Minneapolis, says: "Durkee-Atwood's dependable factory engineering service enables us to guarantee superior V-belt performance for our customers."

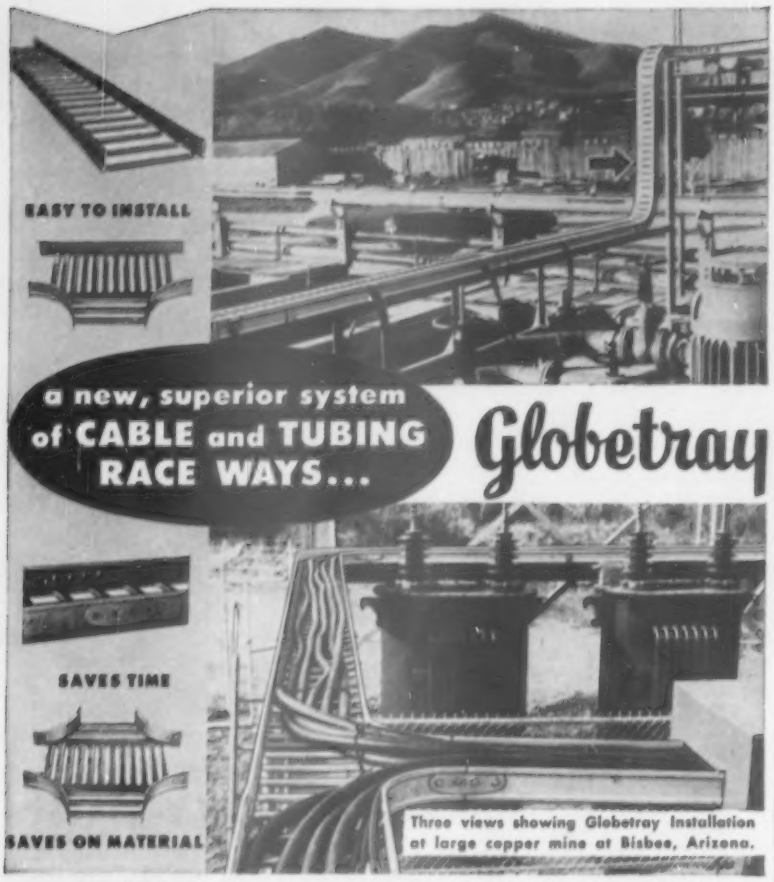
CALL ON DURKEE-ATWOOD. Let D-A's experienced distributor and factory experts help you with your power transmission problems. Find out today about this valuable service to industry . . . no obligation!

FREE! Send for your free copy of "Handy Tips on V-belts and V-drives."

See your D-A distributor or write Dept. FM-11 for catalog that includes conversion tables, engineering data, latest Rubber Manufacturers Association horsepower ratings, drive selections and helpful Do's and Don'ts of V-belt operation.

DURKEE-ATWOOD COMPANY
MINNEAPOLIS 13, MINNESOTA
Manufacturers of

DURKEE ATWOOD V-BELTS



A completely engineered system of cable ways, production produced and die formed for uniformity with up to twice the strength of ordinary trays, by actual laboratory tests. The universal splice plate joins all parts through the side channels only. All curved fittings are joined at the end of the radius (no tangent material is required) permitting continuous curves. This feature provides greater flexibility of application in tight places and creates an endless variety of combinations for a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings.

Comes in 6", 12", 18" and 24" widths, in standard 12' lengths to further speed up installation time. Cable way can be cut to length at any point – insides and bottom always smooth – all sections punched for easy installation – perfect fit at all times. Neat, clean and uniform in appearance.

Write for new complete catalog. Distributors in all principal cities. Contact the Grip-Strut distributor under "Conduits" in the classifed telephone directory.

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FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

53—Polyethylene Drum, 13-gal., is lightweight, inert to corrosives, unbreakable—and made to stack (top and bottom contours allow containers to nest securely one atop another). Has pouring spout, separate opening for filling and venting, bottom hand-grip. *Plax Corp.*

54—Lift Truck is a maneuverable, low-cost, 1500-lb.-capacity model. New D-15 will pivot 360 deg., stack in 103-in. aisles, lift up to 84 in. Weight (less forks) is 2600 lb.—useful where low floor and elevator load limits exist. *Truck-Man Div., Knickerbocker Co.*

55—Belting features leather friction surface, bonded to polymer—is thin and light, but strong. Belt wraps as low as 90 deg. can be used; belts can run at ratios of 20:1. Their normal rated speed is 9000 fpm.—20,000 fpm. in special applications. *Extremultus, Inc.*

Turn to page 198

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MAGNET WIRE
Alkanvar operating temperatures with "hot spots" to 130°C. ■ Alkanvar for high dielectric strength, adherence and flexibility... passes scrape and solubility tests with flying colors. ■ Alkanvar withstands heat shock as well or better than other class "B" films. ■ Alkanvar in cut-through (Navy test) reaches 225°C.-260°C. before shorting.
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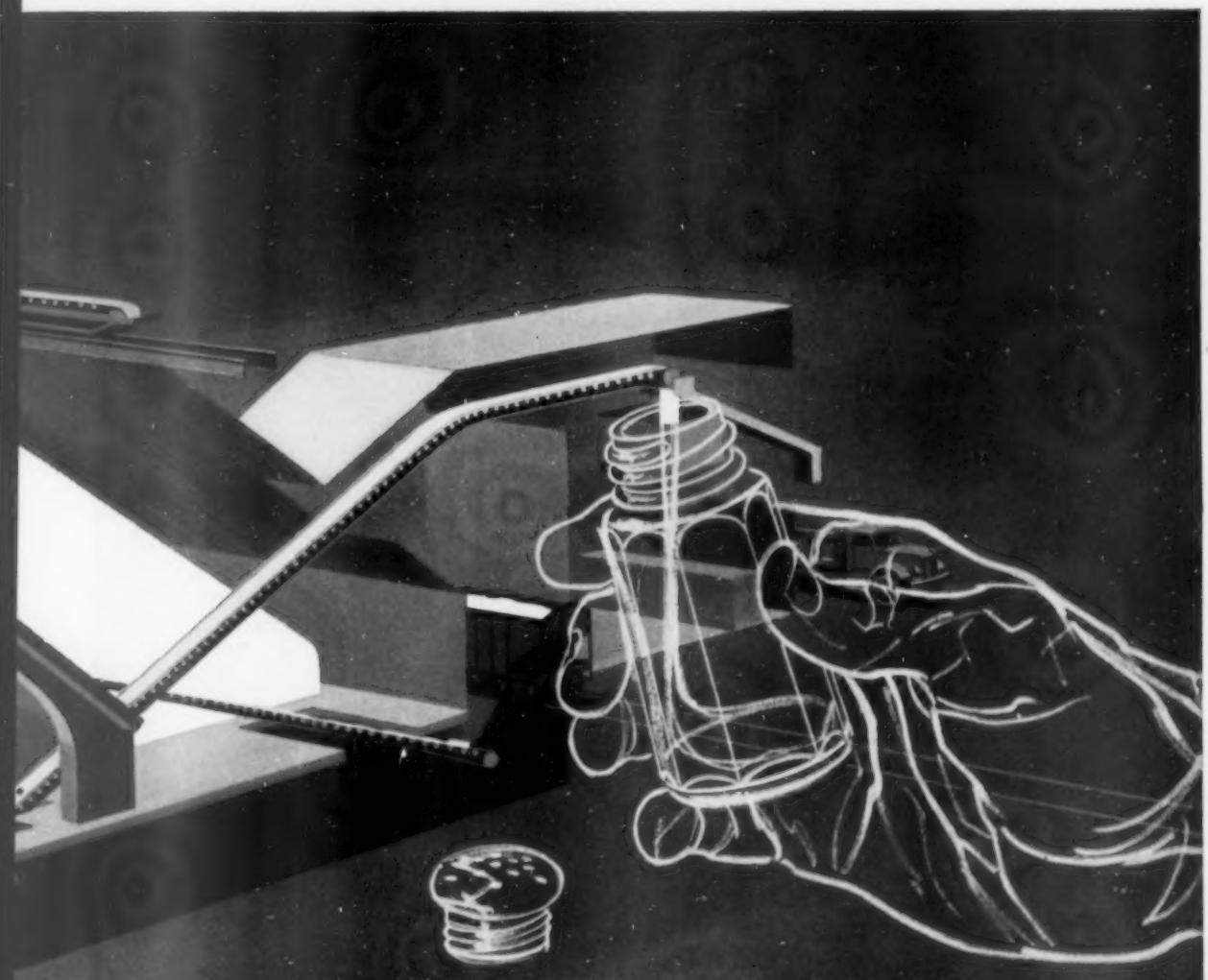

PASS THE SALT, PLEASE

Enough salt to fill 30 million shakers flows hourly in and out of automatic warehousing facilities, engineered by the Paul Weir Company for the International Salt Company, Chicago. A 1250 TPH belt conveyor system, designed and built by Hewitt-Robins, transfers this sea of salt from self-unloading boat, barge, and railroad car to storage and bagging for use by industry and home. The belt conveyor system in the warehouse and in the self-unloading boat are examples of the way we help industry solve its bulk materials handling problems. For complete information, contact us in Stamford, Conn.

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ENGINEERING AND ERECTION OF BULK MATERIALS HANDLING SYSTEMS • "JONES" POWER TRANSMISSION EQUIPMENT

LOOK— NO MUSCLE POWER FOR THIS JOB

. . . as Westinghouse speeds insulator packaging with *Snap-on* impact wrench

Clark Moore, *Snap-on* sales engineer, and Westinghouse manufacturing engineers developed the use of this electric impact wrench on the new packing line for crating apparatus insulators at the Westinghouse Electric Corporation plant at Derry, Pa. The impact wrench has speeded the operation by tightening 35 bolts in the time required to tighten 10 by hand. Officials of Westinghouse state that this *Snap-on* tool pays for itself every ninety days in time saved.

This is another example of how the combination of a *Snap-on* sales engineer's training and experience, plus special *Snap-on* tool equipment, helped a manufacturer save money. If you have a tool problem, get in touch with the nearest *Snap-on* branch or write us. We will arrange to have our representative call on you and render all possible assistance.

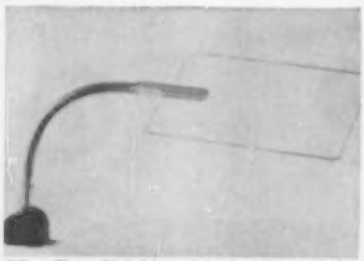
*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8044-K 28th Avenue • Kenosha, Wisconsin

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

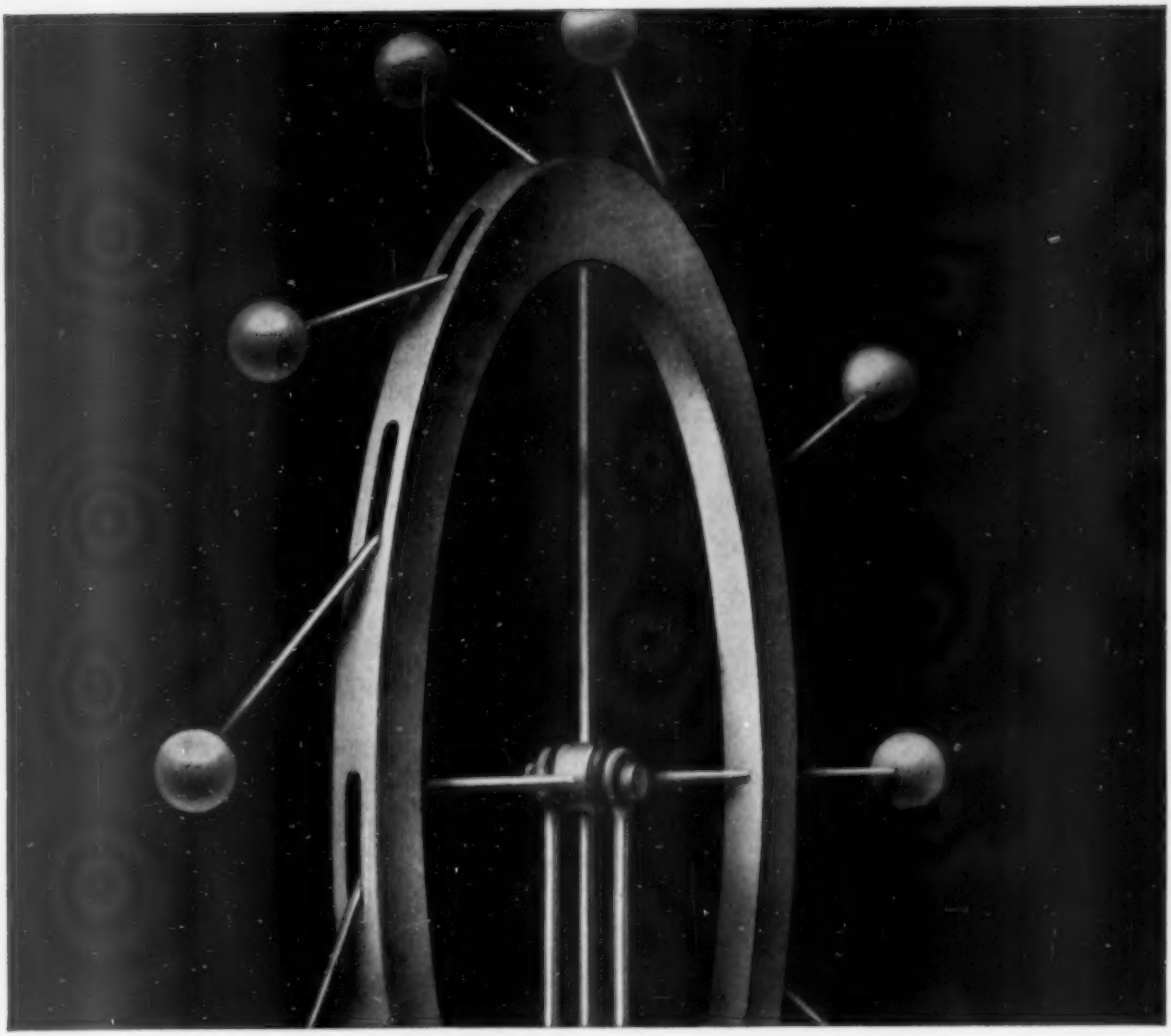
56—Pump, for handling corrosives and hazardous liquids, is self-priming, positive-displacement type. Features corrosion-resistant rubber impellers. All conventional types of mountings; with electrical motor, air motor, pulley-and-chain drive. *Eco Engineering Co.*



57—Eye Shield, with flexible 12-in. arm, is useful on tool grinders, large lathes, and other machinery where a mounting location is not available close to the work. Comes in models with a magnet base or a permanent mounting fixture. *Standard Portable Cord Co., Inc.*

58—Portable Platform, used in conjunction with firm's mobile ramp, permits parallel loading of railcars where track-site space is limited. Removable safety curbs, for loading from either side. Magnesium platform measures 8x8 ft.; 16,000-lb. capacity. *Magline, Inc.*

Turn the page



what ever happened to perpetual motion?

Nobody's ever solved it, and maybe they never will. Complete elimination of friction and wear are seemingly impossible obstacles.

But industry *has* developed machinery that will virtually run forever. The hermetically sealed unit in your refrigerator, for instance. And even equipment that is not sealed – provided that wear-producing foreign elements can be kept out.

Keeping them out is Purolator's business. Our engineers are constantly concerned with improving performance and lengthening life of industrial machinery and consumer goods. We've learned how to filter impurities from toothpaste, water from jet fuel, even sub-micronic particles from air.

Our research, engineering know-how, quality control and manufacturing facilities – developed through three decades of operation in the entire range of filtration – make up an unmatched experience in the business of taking undesirable contaminants out of liquids, gases and paste.

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X marks the windows that won't crack or break!

Shatterproof panes of reinforced plastic put an end to costly plant maintenance!

More and more factories are cutting overhead by replacing conventional windows with panes of reinforced plastic.

In addition to ending breakage, the new panes improve working conditions—minimize the need for artificial illumination. Reinforced plastic replacements admit a soft, diffused, glareless light.

Installation is easy in wood or metal frames. Reinforced plastic panes cut to proper size with a saw and fasten into place with screws, bolts or nails. Their smooth surface cleans easily—requires no finishing.

This cost-cutting new window material is made by bonding fibrous glass with polyester resins. Panels come in a variety of colors, either flat or corrugated. For list of panel manufacturers, you are invited to write Monsanto Chemical Company, Plastics Division, Room 1253, Springfield 2, Mass.

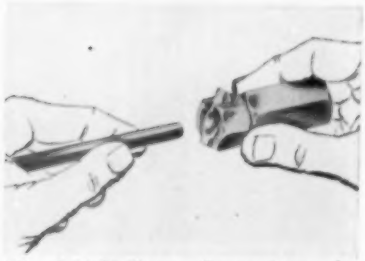
MONSANTO

Broken window panes are being replaced with shatterproof panels of reinforced plastic. Costly replacement is no longer a problem.

Basic ingredients for the polyester resins used in molding reinforced plastic panels are made by Monsanto Chemical Company. These include Monsanto styrene monomer and phthalic and maleic anhydride.

For more about these products, circle item numbers on Reader Service card next to back cover.

59—Tripod Tank for elevated water storage is an all-welded, economy model. Available in 15,000- to 75,000-gal. capacities; standard heights to bottom of tank range from 25 to 125 ft. Simple to erect; minimum maintenance and painting. *Chicago Bridge & Iron Co.*



60—Self-Sealing Connector for straight end tubing is ideal for applications involving pressure or vacuum testing. It permits quick, leakproof connection of element under test to the source—without tools, threading, or soldering. *Mechanical Products Corp.*

61—Valve, pressure-reducing and relief type, is for air, gas, oil, or water service. Operates on initial pressures to 4000 psi.; features adjustable control pressures that can vary up or down by as little as 2 psi. over a range as wide as 0-2500 psi. *Atlas Valve Co.*

Turn the page

Norgren SPRAY-LUBE

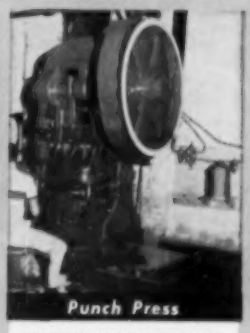
INCREASES PRODUCTION from MACHINE TOOLS

- Increases Tool Life
- Improves Quality of Work
- Reduces Maintenance Costs

Metal Cutting Saw

CUTS FASTER . . . DOESN'T OVERHEAT

Oliver Sawing Machine cuts 4", to 6" slabs of non-ferrous metals. By changing to SPRAY-LUBE: (1) Fusion of chips to saw teeth ended. (2) No galling—surfaces now resemble machined finish. (3) Saw feed faster—cuts 6" aluminum slabs at 5 fpm.



Punch Press

OUTPUT INCREASED 15% DIE LIFE INCREASED 100%

Formerly lubricated by hand swabbing every 6 cycles of press, splashing on machine, floor and operator Now, SPRAY-LUBE automatically lubricates die and blank every cycle, increasing die life 100% and output 15%. Lubricant cost cut in half.

Tapping Machine

30% MORE OUTPUT

SPRAY-LUBE replaced flood system on tapping machine at the Square D Company, eliminating excess of lubricant and ending time lost for cleaning parts. Splashing lubricant on operator and floor also ended. Production increased 30%.

Gear Hobbers

$250 A YEAR LUBRICANT SAVING PER MACHINE

Cullman Wheel Co. replaced splash coolant systems on gear hobbers with SPRAY-LUBE. Results: (1) Tool life increased. (2) Tool grinding time reduced. (3) Working conditions cleaner, safer. (4) $250 a year per machine saved in lubricant costs.

Turret Lathe

OUTPUT DOUBLED

SPRAY-LUBE on lathe at O.K. Rubber, Inc. has: (1) Increased surface cutting speed from 45 to 75 rpm, nearly doubling output of machine. (2) Ended welding of chips to tool. (3) Increased depth of cut. (4) Improved quality of work.

Chain Drive

OVER TWO TIMES LONGER CHAIN LIFE

At Wagner Electric in St. Louis, SPRAY-LUBE automatically lubricates chain drive on degreasing machine. Chain now runs smoothly and quietly. Lubricant, removed by the hot cleaning solution, is now constantly replaced, doubling chain life.

For complete information about Norgren SPRAY-LUBE, call your nearby Norgren Representative listed in your telephone directory—or WRITE THE FACTORY for Bulletin 537.

C.A. Norgren CO.

C. A. NORGREN CO. 3421 So. Elati St., Englewood, Colorado

Logan Roller Conveyor in machine tool plant. Gate sections in foreground provide passageway through assembly line and step plates between rolls allow easy access for operators to work stations. Transfer car handles incoming sub-assemblies.

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Small business today . . . large business tomorrow. In this country we don't have to "stay put." Development and growth are characteristics of American industrial leaders. An important factor is the insistence on highly efficient material handling methods. Take Logan Conveyors. The nation's foremost industries use this equipment to step up production tempo, enlarge capacity, improve deliveries, conserve manpower. These are Logan functions which you, too, can use profitably. Write for nearest engineer or for further information.

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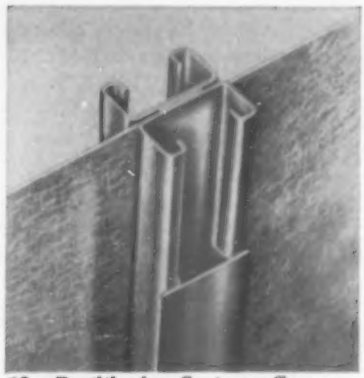
Logan Conveyors

FACTORY / EQUIPMENT NEWS . . .
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

62—Electric Runabout is an agile and compact personnel carrier for intra-plant travel. Low-cost unit weighs only 250 lb.—safe for light-load floors, elevators. Powered by 6- to 12-volt battery system and gearhead motor; speeds up to 10 mph. *Kalamazoo Mfg. Co.*



63—Partitioning System offers easily installed metal framing plus wide choice of panel materials. Continuous utility slot on both sides of framing members permits quick attachment of piping, electrical conduit, switch gear, shelving, brackets, and so on. *Versabar Corp.*

64—Dust Collector, cyclone-type, recovers large volumes of bulky, sticky dust in tire recapping plants, woodworking shops—wherever machines create lots of lint, chips, or shavings that might clog standard filters. Feeds into standard 55-gal. drums. *Torit Mfg. Co.*

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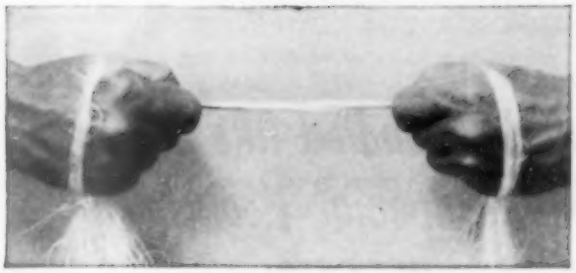
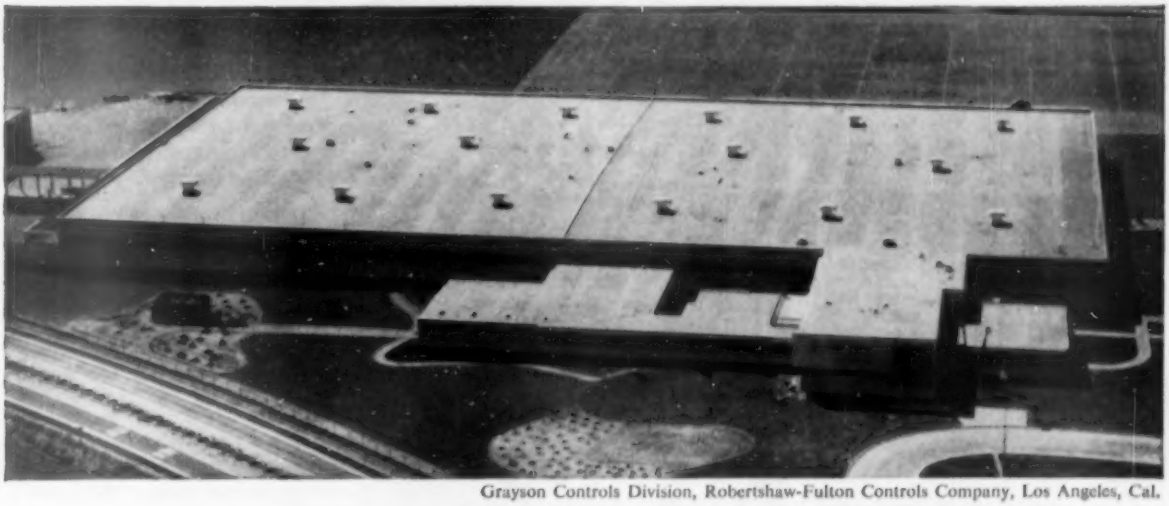


The same FIBERGLAS strands that reinforce this fishing rod . . .



Grayson Controls Division, Robertshaw-Fulton Controls Company, Los Angeles, Cal.

. . . can mean lower roof maintenance for your building

Now Fiberglas* Built-Up Roofing cuts the chance of roof failure and expensive roof repairs on factories and other commercial buildings. This development can save you maintenance dollars for decades to come!

In this revolutionary roofing, Fiberglas mats are welded with asphalt to form a single tough, waterproof shield—*reinforced in every direction.* It's the identical principle of reinforcement that puts strength into Navy boat hulls and body armor. The strength and solidity of a Fiberglas-reinforced roof contrasts sharply with the separate layers of old-fashioned built-up roofing.

Nine years of experience, over 6 million square feet of roofing, prove Fiberglas roofing reinforcement will never rot, never decay. Under any weather conditions, Fiberglas roofs can be bonded for up to 20 years!

Beneath the Fiberglas-reinforced built-up roof, light and durable Fiberglas Roof Insulation gives you year-round indoor comfort—with lower heating and air-conditioning costs. Today's newest roofs take advantage of these Fiberglas products to gain new strength, extra thermal efficiency, fire-safety, permanence. *It's amazing the* difference *Fiberglas makes!*

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A 3000 lb. die handled like a feather with these special Economy die-handling Lifters

Push-button control for elevating the platform, propelling the machine down the narrow aisles, and moving the dies in and out of the racks, gives finger-tip high speed handling. The storage capacity is multiplied ten times the floor area and with every die located for immediate selection.

This die handling system, Economy engineered and built, is an example of how materials handling problems can be solved by Economy engineers who have specialized in custom-built machines for over 50 years.

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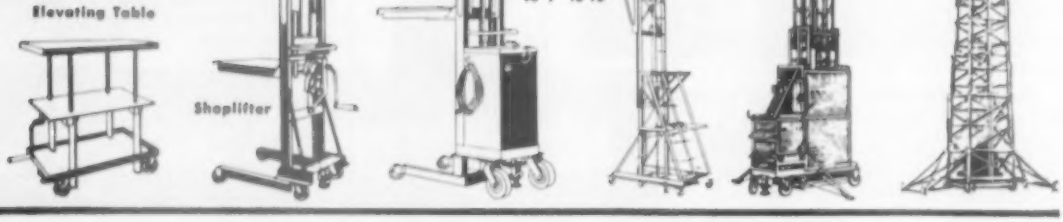
Economy also make a complete line of standard lifters



THE SHORTAGE OF SCIENTISTS AND ENGINEERS:

What Can Be Done About It?

There is no easy or quick way to overcome the shortage of scientists and engineers that has become a threat to our national security and economic progress. The solution can come only through diligent efforts extending over several years to bring the supply of technically trained people into balance with our needs. Meanwhile, the pressure of the shortage can be relieved if industry, government and education make better use of the limited number of scientists and engineers now available.

Earlier editorials in this series have discussed the dimensions of the shortage of technical manpower, its meaning for our national security and our economic well-being and the causes of the shortage. This final editorial will survey some of the measures that can be taken to overcome the shortage. Most of the proposals presented here have been suggested elsewhere. But in combination they appear to offer the best hope of an answer to this serious national problem.

Soviet Methods Not For U. S.

It is clear that no crash program, inspired by panic and designed indiscriminately to drive hordes of high school students into science and engineering, is suitable for the United States. Even if we adopted Soviet methods of channeling a large portion of our brightest young people into technical fields, it would be at least four years before results appeared in the volume of college graduates. And such an approach would do no credit to the American way of life.

Any crash program, whether it involved totalitarian methods or simply overselling the advantages of technical careers, would be objectionable for other reasons as well. It would jeopardize the quality of scientific and engineering training. It would put many young people in fields where they have little aptitude and deny them to other fields for which they are better equipped. And, if carried too far, it might even result in the overcrowding that was feared prematurely a few years ago.

The most important problems for the long run, as the preceding editorial in this series indicated, are in the area of education. Any real solution must reduce the loss of talented high school graduates who do not continue their education for financial reasons or because of lack of interest. Also, it must improve the quality of high school preparation in science and mathematics and, above all, relieve the critical shortage of teachers.

Basic Needs in Education

Substantial increases in salaries of teachers in most of the nation's school systems are essential if high school students are to receive adequate preparation for courses in science and engineering. Pay scales that have lagged behind rising living costs and salaries available in industry have placed great strain on even the most devoted teachers. There has been a sharp drop in the number of new graduates trained to teach science and mathematics, and of this smaller number many have decided not to follow careers in teaching.

Raising teachers' salaries to more realistic levels must be primarily the job of local school districts, aided by state governments. If, in face of rapid increases in school enrollments, local and state resources prove insufficient, then federal aid will have to be considered. Higher teachers' salaries, however financed, inevitably mean higher taxes. But without appreciable improvement soon, the quality of our entire educational system is in danger.

At the college level also, financial aid is needed to provide scholarships for promising students and to increase faculty salaries. (An earlier series of editorials dealt more fully with these problems, and business aid to higher educational institutions has been mounting at a gratifying rate.)

But not all the educational problems related to the shortage of scientists and engineers can be solved with money. Science and mathematics have steadily been de-emphasized as more youngsters have gone to high school for terminal education rather

How business is helping to relieve the shortage of technical manpower

Summary of a
Survey by McGraw-Hill Correspondents

- Sponsoring summer study programs for high school teachers
- Arranging cooperative work-and-study programs for students
- Sponsoring college fellowships and scholarships in science and engineering
- Paying tuition of employees taking science and engineering courses
- Keeping college faculties abreast of new developments in industry
- Hiring high school science teachers for summer and part-time work
- Giving old, but usable, laboratory equipment to schools
- Cooperating in high school science exhibits
- Sponsoring regional science fairs
- Sending speakers and training aids to schools
- Opening plants for student tours
- Analyzing jobs to relieve engineers and scientists of routine work

The McGraw-Hill Department of Economics will be glad to hear of any other ways business is helping relieve the shortage.

than for college preparation. This de-emphasis must be reversed.

Techniques of instruction, furthermore, can stand improvement at all levels of education. Professor E. P. Northrup of the University of Chicago observes: "In the past fifty years . . . there has been a revolutionary change in the character of mathematics, yet not a trace of this change is to be found in the curricula of all but a handful of secondary schools throughout the country." Colleges and universities may have to examine old fetishes about light teaching loads and small classes in order to make more efficient use of their faculties.

What Industry Can Do

Industry has the immediate problem of better utilization of available technical manpower and the long-range responsibility of helping increase our resources of trained people. Frantic recruiting practices and reckless bidding up of starting salaries—financed largely by government money for defense orders — are not the answer. There is need for earnest consideration of incentives for experienced scientists and engineers, who too often must look to sales or executive positions for adequate financial recognition.

Industry in many instances could make more efficient use of engineers and scientists by shifting work to technicians, clerical personnel and even machines. One company found that 15% of the time of an engineering design group was spent on routine jobs and that this valuable time could be saved by adding a technician and a clerical worker to the group.

Other potential sources of technical manpower could be tapped more extensively to relieve the shortage. Very few women have entered what has been traditionally a man's world. Negroes are only slowly gaining educational and employment opportunities in technical fields. And many experienced older men can still give useful service.

A Good Beginning

Much is being accomplished already in efforts to attract more young people into scientific and engineering careers. A summary of some of the things business is doing is presented above. Other notable contributions are being made by such organizations as the professional engineering and scientific societies (especially through their manpower commissions), the National Science Foundation, the National Research Council, the National Education Association, the National Merit Scholarship Foundation and the Thomas Alva Edison Foundation.

Results are beginning to appear in rising enrollments in engineering schools and technical institutes. Between 1951 and last year, according to McGraw-Hill's annual survey of technical institutes, enrollments in these schools rose from 46,000 to a record 67,000. Engineering enrollments rose in the same period from 166,000 to 243,000. A rising tide of graduates is already being made available to American industry.

This is a good beginning. But only with wider appreciation of the serious implications of the shortage of scientists and engineers and intensified efforts on the part of business, government and education to relieve the shortage can we hope to overcome this threat to our national security and economic well-being.

This is one of a series of editorials prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C McGraw

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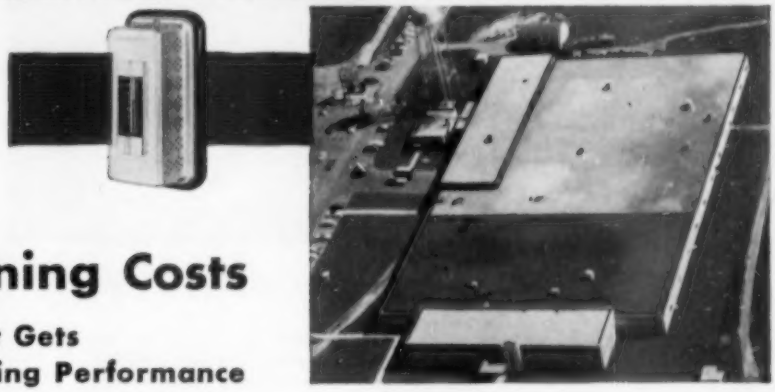
JOHNSON CONTROL Helps Cut Air Conditioning Costs



New 145,000 sq. ft. Plant Gets Waste-free Heating-Cooling Performance

The cost-cutting features of Johnson Automatic Temperature Control make possible substantial operating savings in heating and cooling The New York Air Brake Company's fully air conditioned plant at Kalamazoo, Michigan.

For example, with Johnson "economizer" sequencing, *outdoor* air, rather than mechanically cooled air, is used for cooling the factory area whenever outdoor temperatures permit. All eight factory air conditioning systems are automatically sequenced to minimize coolant requirements.

Further savings are provided by Johnson Master-Submaster Control which compensates for changes in outdoor temperature and limits heat output to the minimum required for consistent comfort.

Strategically located Johnson Room Thermostats maintain ideal temperatures the year 'round in all production areas, the cafeteria and offices. Both heating and cooling waste are effectively eliminated throughout the entire building.

Whether it's comfort control you need or protective temperatures and humidities for products and processes, a Johnson-engineered control system will quickly pay for itself in precision performance as well as lower operating costs. Why not ask a nearby Johnson engineer for recommendations on your control problems? His ideas are yours without obligation–and they may very well result in important savings to you. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

The New York Air Brake Company, Kalamazoo, Michigan. Miller Davis Engineers, Inc., architects and engineers; Miller Davis Co., general contractor; Miller Davis Plumbing & Heating Co., mechanical contractor; all of Kalamazoo.

T-900 Remote Bulb Master Thermostat

T-901 Remote Bulb Submaster Thermostat

P-251 Long-Stroke Piston Operator

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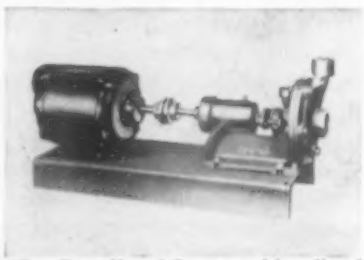
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

65—Plastic Caps protect grease fittings between lubrications or during spray painting. "Lubseals" snap over all standard fittings; prevent dust, grit, abrasives from collecting. Four colors, for coding lubrication schedules at various fittings. *Wilson Plastics, Inc.*

66—Low-Line Roof Ventilator is rectangular-shaped, designed to deflect expelled air downward to the roof. 11 throat sizes, in both gravity and powered models; latter available also as a fresh air intake. Many capacity ratings; easy to service. *The Swartwout Co.*



67—Centrifugal Pump, rubber-lined side suction model, is made to handle non-oxidizing acids and solvents detrimental to standard fitted pumps. Heavy-duty model, with rubber impeller and stainless steel shaft, available as a motor- or belt-driven unit. *The Deming Co.*

Turn the page

JalKlamp splices

have full rope strength

Now you can cut wire rope sling costs and still get stronger, safer slings with JalKlamps, the new special alloy sleeves for wire rope splicing.

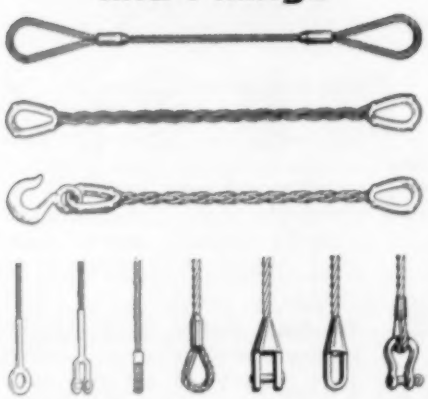
When hydraulically pressed around the rope, the JalKlamp's non-corrosive alloy actually flows into every space between the wires and between the strands of the rope. Result: a neat, permanent, watertight splice that develops the full strength of the rope.

JalKlamp slings and terminals are available in all standard wire rope constructions with diameters from ⅛″ to 2″. They're part of a full line of JalFlex Slings and Fittings including all types of braided slings and swaged fittings that can meet your individual wire rope assembly requirements.

Write for complete information on the JalFlex Slings and Fittings today.

Designs for Every Need

JalFlex Slings and Fittings



Jones & Laughlin

STEEL CORPORATION · PITTSBURGH

JL STEEL

Use Aluminum Paint to reduce maintenance cost!

Aluminum Paint actually puts a *protective shield* on rustable metal and masonry surfaces. Usually one coat is all that's needed. And it lasts and lasts and lasts!

Aluminum Paint Protects against corrosion from fumes and smoke; seals against moisture and rust; reflects light and heat (makes everything brighter); reduces evaporation of volatiles; holds heat expansion to a minimum.

Reynolds Metals Company does not make aluminum paint. But if you would like the names of manufacturers who rely on the high quality of Reynolds Aluminum Pigments, we'll gladly send you the list. Just use the coupon below.

Aluminum Roof Paints and Coatings Add Years to Roof Life

Asphalt-Aluminum roof paints and coatings provide low-cost, long-life protection for built-up and rustable metal roofs. Also reflect sun's heat to keep buildings up to 15° cooler in summer. Ask the paint salesman to show you his heat reflection demonstration. Insist on Asphalt-Aluminum roof paint or coating with this Warranty Seal. It assures you of an approved vehicle and at least two full pounds of pure aluminum pigment in every gallon.

See "CIRCUS BOY", Reynolds new dramatic series, Sundays, NBC-TV.

Reynolds Metals Company
P.O. 1800-PJ, Louisville 1, Kentucky

Please send me information about:
- ☐ Aluminum Paints.
- ☐ Roof Coatings.
- ☐ Also send list of aluminum paint manufacturers.
- ☐ Also send list of asphalt-aluminum roof paint and coating manufacturers.

Name_____
Company_____
Address_____
City_____ Zone____ State_____

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

FACTORY / EQUIPMENT NEWS
Begins on page 160

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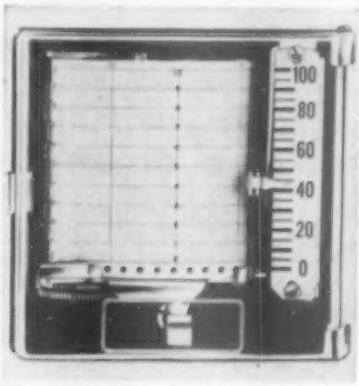
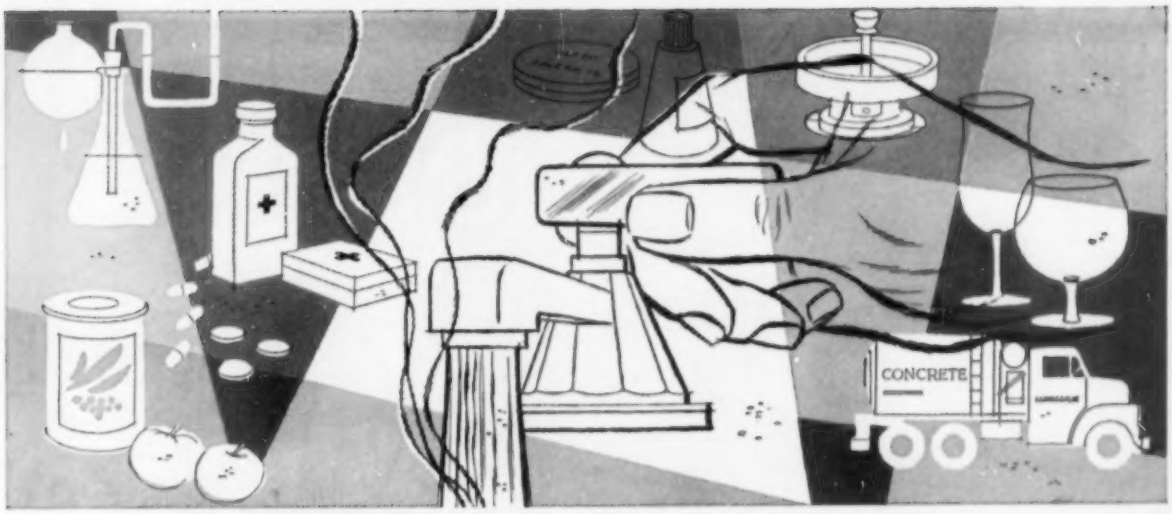


68—Electronic Potentiometer produces a continuous record of any variable convertible to an electrical quantity—such as temperature, pressure, flow, speed, pH—on a 3-in. strip chart. Small, self-balancing recorder is housed in a case only 5-in. sq. *The Bristol Co.*

69—Incinerators, custom-built for particular factory requirements, will pass most rigid smoke-abatement codes. Units combine a secondary combustion chamber, extra-long fire-travel, plus spark-and-smoke eliminator for smokeless, odorless operation. *Winnen Incinerator Co.*

70—Paint Heater fits easily into existing cold-spray process systems as a portable or stationary unit. Raises paint temperatures to between 160 and 180 deg. Features a removable paint tract for easy servicing and inspection; 220 or 110 volts. *Binks Mfg. Co.*

Turn the page



GET ON-THE-JOB WATER HEATING

for better hot water service . . . at lower cost!

Do away with costly steam transportation to points where hot water is used. Install the "*Ruud-has-everything*" line and get the quantity and temperature of hot water you need . . . *right where you need it!*

IN THE CAFETERIA . . . the Ruud two-temp Sanimaster supplies continuous 180° sanitizing hot water for the automatic dish-washing machine and the coffee-maker. And, at the same time from the same tank, you have 140° regular-hot water for cafeteria general uses.

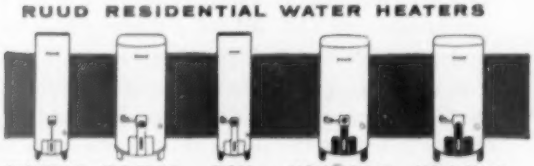
IN PLANT WASHROOMS . . . Sanimaster supplies plenty of even-temperature hot water for Bradley washfountains and showers.

OTHER RUUD USES . . . first-aid stations, office and plant lavatories, general cleaning, processing operations, water towers for sprinkling systems, boiler make-up water, and many, many others.

When you install Ruud gas water heaters for all hot water demands you get a perfect *on-the-job* hot water service at the lowest cost-per-gallon, lowest cost-per-year. You have long-life, trouble-free units to supply hot water in *any quantity* and at *any temperature* you need. You save space . . . need no large, bulky external storage tanks—no high-cost steam transportation lines.

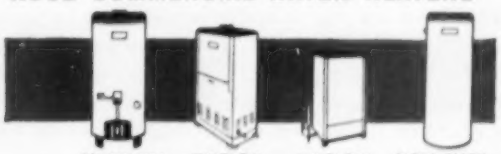
For plant operations, you just can't beat Ruud . . . the "*has-everything*" line. Let us talk over your hot water or processing problems with you . . . or send now for further information. Fill out and mail the coupon below for prompt action.

RUUD RESIDENTIAL WATER HEATERS



ENAMELINE PACEMAKER | ENAMELINE HISPEED | ALCOA ALLOY HISPEED | ALCOA® ALLOY LAUNDRY-MASTER | ALCOA ALLOY SUPERSPEED

RUUD COMMERCIAL WATER HEATERS



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MAIL THIS COUPON TODAY

RUUD GAS WATER HEATERS

Kalamazoo 24, Michigan • Toronto 14, Ontario

RUUD MANUFACTURING CO.
2025 Factory St., Kalamazoo 24, Mich. B-20

☐ Please send me further information on the "Ruud-has-everything" line.

☐ Have a Ruud representative call on me.

NAME _____

ADDRESS _____

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® Aluminum Co. of America

A typical Murray drilling rig powered with
220-hp. LRO Waukesha and 230-hp. V-12 Le Roi engine.

How a steak dinner saved me $1,000 a day!

by L. D. Murray, Murray Drilling Co., Houston, Texas

"Engine failure due to overheating used to be a big problem when I was drilling in West Texas . . . downtime was costing me as much as $1,000 a day.

"Conditions were the worst I've ever encountered before or since. There were no prevailing winds to head the engines into. We were drilling 13,700-foot wells at an altitude of 4,200 feet and temperatures often ranged upwards of 100°. Consequently, our engines were constantly running well above the boiling point and at times they'd pull the mercury down to 9 or 10 inches. You can guess the rest . . . with expenses running about $25,000 a year on each of six engines, we were not exactly getting rich.

"Well, one day I told a friend of mine about my engine troubles, and he told me if I'd buy him a steak he'd solve my problems. So I bought him that steak (it was even big by Texas standards), and he told me to try Union's T5X Motor Oil . . . just that and nothing more. So before we'd finished lunch, I ordered five barrels of T5X sent out to the rigs.

"From that day on, our engine troubles were over. Water temperatures held at 190° and oil consumption dropped from 10 gallons to 1, sometimes even half-a-gallon per day. Instead of changing oil every Sunday morning, we found we could run T5X Motor Oil 500 hours, changing it and the filters every third or fourth Sunday. And would those engines deliver on T5X! If I had to shut one down for any reason, the other two would pull the load.

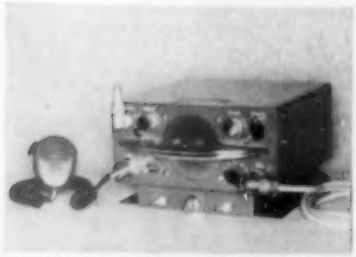
"To make a long story short those engines stayed on the line for three years after that, using only T5X, and the only expense aside from routine maintenance was an occasional tuneup. I think that Union T5X is so far ahead of any other motor oil, it's impossible to compare them."

What more can we add except to remind you that T5X, the *amazing* purple motor oil, is immediately available from your nearby Union Oil representative.

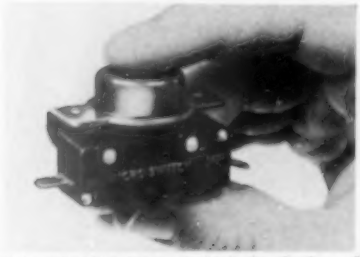
UNION OIL COMPANY 76
OF CALIFORNIA

Los Angeles: Union Oil Bldg. • New York: 45 Rockefeller Plaza • Chicago: 1612 Bankers Bldg. • Philadelphia: Eastwick Ave. & Edgewood St. Dallas: 313 Fidelity Union Life Bldg. • Kansas City, Mo.: 612 W. 47th St. New Orleans: 644 Nat'l Bank of Commerce Bldg. • Boston: 214 Harvard Ave.

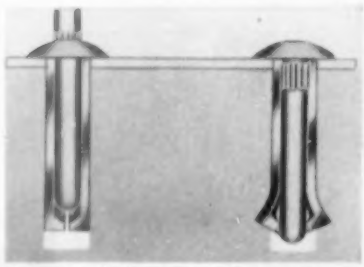
For more about these products, circle item numbers on Reader Service card next to back cover.



71—Two-Way Radio, operating in the 144- to 174- megacycle frequency range, is suitable for low-power industrial applications, stationary or mobile. Bantam unit operates from 6, 12, 24, 32 volts d-c or 117 volts a-c without modification. *Bendix Radio Div.*



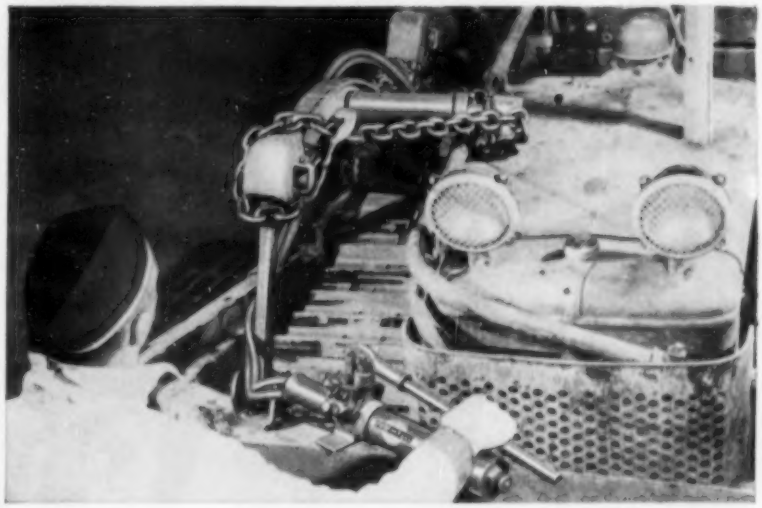
72—Pushbutton Switch is designed for a broad range of applications. Ready-to-install model 71PB2 has high electrical capacity, snap action. Single-pole, double-throw; rated at 15 amp., 125 or 250 volts a-c; 1 hp., 250 volts a-c; ½ hp., 125 volts a-c. *Micro Switch.*



73—Pin-Grip, one-piece masonry anchor, will secure pipe clamps, electrical fixtures, furring strip, insulation board, wood panels, metal signs, etc., to any kind of masonry. Just drive in protruding pin until flush with head for permanent, tight fastening. *Star Expansion.*

Turn to page 216

This JACK has hundreds of industrial uses.....



For Instance... **HEIN-WERNER**

Remote Control "Push and Pull"

HYDRAULIC JACK

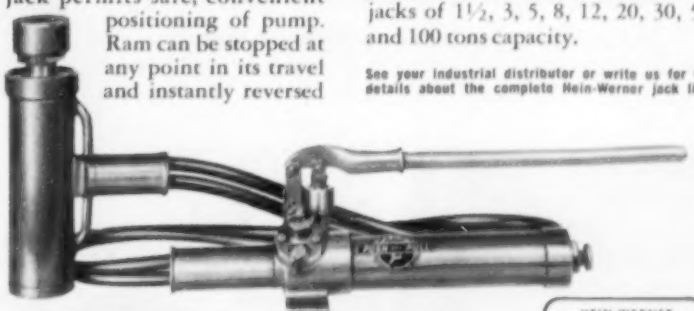
quickly straightens bent parts

Plant maintenance men can practically "do the impossible" with the aid of a Hein-Werner "Push and Pull" Jack. Straightening a bent part on a machine (as shown above) is but one of many industrial jobs that can be handled faster, safer, and more economically with a Hein-Werner "Push and Pull."

This versatile jack operates in any position. Remote control operation of jack permits safe, convenient positioning of pump. Ram can be stopped at any point in its travel and instantly reversed by merely turning a valve. Available in models of 4, 10, and 20 tons capacity, either separately, or with choice of varied attachments. 10 and 20 ton models are available with gauge.

Hein-Werner manufactures the F-4 PUSHMASTER with self-retracting ram of 4 tons capacity for direct pushing . . . also a complete line of hydraulic industrial jacks of 1½, 3, 5, 8, 12, 20, 30, 50, and 100 tons capacity.

See your industrial distributor or write us for full details about the complete Hein-Werner jack line.



HEIN-WERNER CORPORATION
WAUKESHA, WISCONSIN

Hein-Werner stock listed on Midwest Stock Exchange since 1936

HEIN-WERNER MANUFACTURES AND SELLS MORE HYDRAULIC JACKS THAN ANY OTHER COMPANY IN THE WORLD

looking for a
STARTER?
Motor and Control-
standard ratings now
available for immediate delivery
from warehouses coast-to-coast!

5 good reasons why the WESTINGHOUSE *Life-Line*starter* is your best starter buy:

1. A UNIFORM AND COMPLETE LINE
2. ADVANCED DESIGN
3. COMPLETE APPLICATION AND SERVICE FACILITIES
4. IMMEDIATE DELIVERY
5. COMPETITIVELY PRICED

Ask your Westinghouse sales engineer to show you the new Life-Linestarter presentation "Looking for a Starter." It's full of information that will be helpful to you on many of your projects.

When looking for a starter, you'll be impressed with the uniform and complete line of *classes*, *enclosures* and *sizes*. Your every requirement is anticipated and met when you specify Westinghouse Life-Linestarters.

Looking further, you'll find the years-ahead features that make Westinghouse Life-Linestarters the most advanced in the industry. (1) Front removable parts; (2) Bimetallic disc overload relay; (3) Electrical interlocks, that can be arranged normally open or closed; (4) De-ion® arc quencher; (5) Double-break, silver-to-silver contacts; (6) Straight-through wiring. On complex applications, Westinghouse district industrial control engineers are available for consultation. 265 Westinghouse warehouses across the country stock Life-Linestarters and renewal parts for immediate shipment.

Look to Westinghouse for your Linestarter® needs—call your local Westinghouse sales engineer, or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa., for complete information. J-21974-X

*Trade-Mark

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

Mobilift's flexibility in handling motors, compressors, dies, tools and even 20-ft. lengths of steel rods makes it the number one choice at Quiet-Heat Manufacturing Corporation.

THESE JOBS PROVE MOBILIFT'S HIGH ECONOMY . . . RUGGED EFFICIENCY

A Mobilift does the work of three men in handling 165 kinds of hot and cold nesting cups at Solo Cup Company.

Prove for yourself how a Mobilift® "Sit-Down" or "Stand-Up" Fork Lift Truck can help you cut costs *at once* – by substantially lowering operating and maintenance expenses . . . reducing man-hours per job to a bare minimum.

Only Mobilift Trucks give you high free lift at no extra cost . . . smooth Mobil-Matic* drive . . . fingertip controls for easier operation, and many other exclusive features.

Mobilift "Sit-Down" and "Stand-Up" Trucks operate on LPG or regular gas, and range from 2000 to 5000 lbs. capacities. Mobilift Sales and Service is available in 75 cities throughout the U. S. and Canada.

*Trade Mark

A Mobilift reduced highway truck loading time from 15 to 5 man-hours at M. M. Stevenson & Co.

FREE TO YOU!

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5231 Lamson Street
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Please send me a *free* copy of:
☐ Mobilift "Sit-Down" Folder on How Mobilift's Exclusive Features Save Dollars by Increasing Efficiency.
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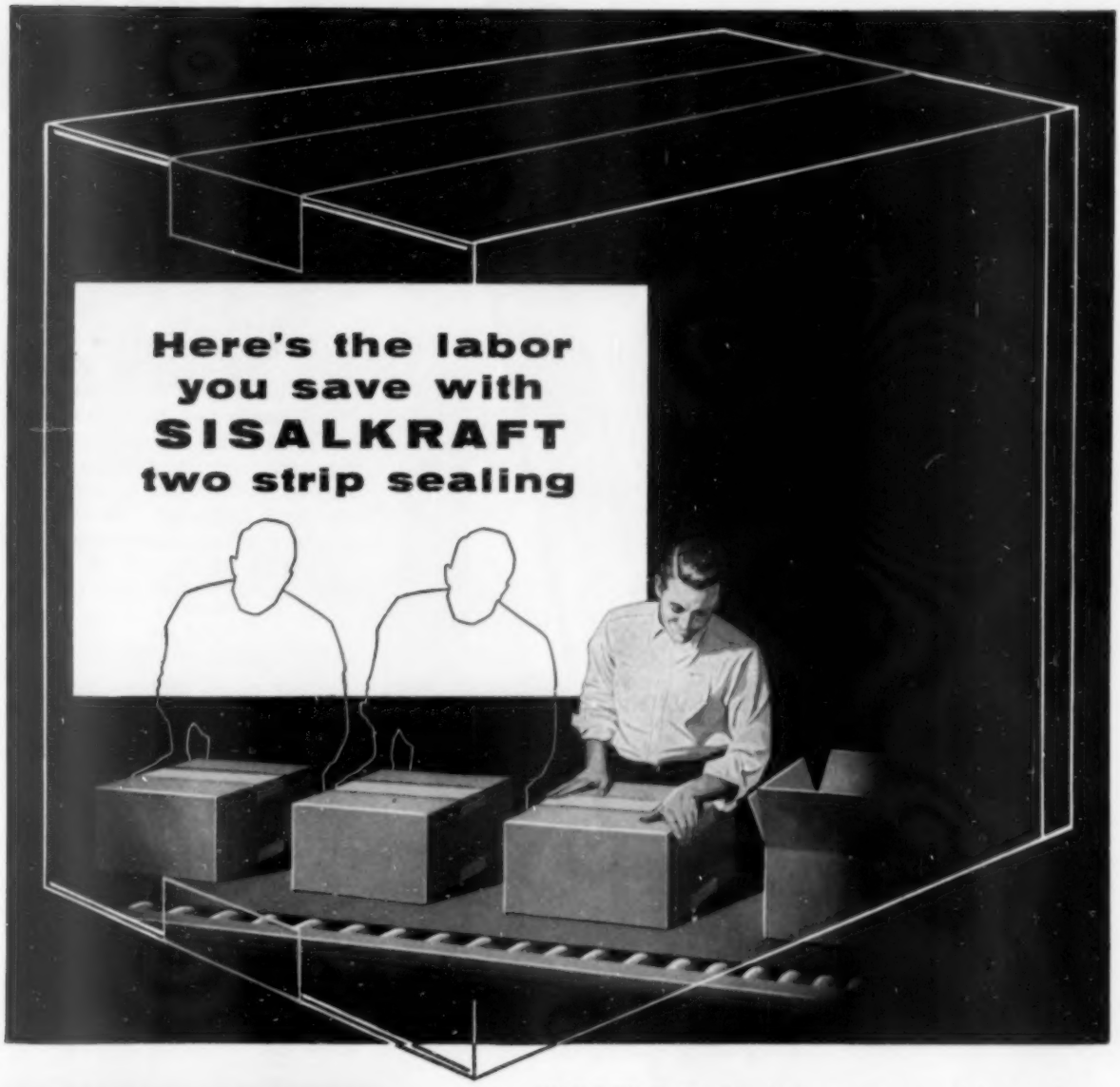
Name..... Title.....
Company.....
Address.....
City..... Zone..... State.....

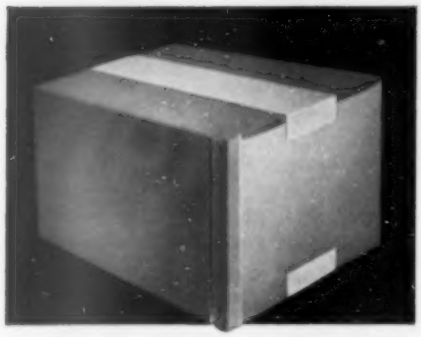
For more about these products, circle item numbers on Reader Service card next to back cover.

74—Tool Balancer above will suspend 50-lb. loads. Three more models (20-40 lb.) for heavy-duty use with impact wrenches, multiple nut setters, etc., all have built-in safety lock to prevent tool dropping. Other models available for small, light tools. *Gardner-Denver Co.*

75—Pan-Link Conveyor doesn't need the usual chains for carrying heavy items (such as castings, forgings, stampings, glass cullet, spiral metal turnings, hot parts). Flat side skirts serve as links to insure correct pitch and to contain materials. *Hapman Conveyors, Inc.*

Turn the page





UNDER RULE 41 railroads have now approved the use of 2 strips of reenforced tape instead of 6 — and rugged Sisalkraft Sealing Tape is the tape to use. Its tough glass reenforcing withstands the roughest handling yet its flexibility makes for easy sealing. See your paper merchant or write us for more facts.

CORNER TAPED BOXES ARE BEST — You get even corners for good stacking . . . greater safety for the handler . . . no damage to merchandise. And they are best of all when closed with SISAL TAPE, the standard of the industry — or non-asphaltic LOKABOX, the world's strongest corrugator's tape.

SISALKRAFT TAPES

Glass-Reenforced

AMERICAN SISALKRAFT CORPORATION
Attleboro, Mass.
Makers of base stock for the Gummed Paper Industry

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

76—Magnetic Disk Brake is explosion-proof; UL-approved for electric motors operating where combustible dust creates a hazard to men and equipment. Series 70: maximum torque ratings of 10, 25, 50, and 75 ft. lb.; floor or motor mounting. *Stearns Electric Corp.*

77—Liquid Soap Dispenser, quart size, eliminates frequent refilling. Each stroke of valve delivers a measured amount of soap; won't drip because valve is above liquid level and pumps soap from the bottom. It's all-metal, easy to clean. *American Dispenser Co., Inc.*

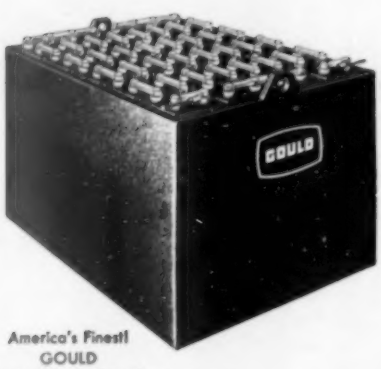
78—Six Starter-Modification Kits fit maker's magnetic starters for special conditions. Change-over (installing pushbutton in cover, changing coil, adding over-load relay, etc.) can be done quickly, on the spot, using just a screwdriver. *General Electric Co.*

Turn the page

"They made me a V.P. for specifying GOULD Research-built BATTERY POWER"

A healthy reward awaits *anyone* who chooses Gould battery power. Not only is battery power the most economical power you can buy, but Gould power gives you extra performance and extended service life possible only through years of basic and applied battery research.

Another reason for specifying Gould is Gould's Field Engineering Service. Covering all industrial centers in the nation, it's the finest in the industry . . . helps keep your batteries working at top capacity . . . adds months to their normal life. Get more power per dollar with Gould research-built battery power!



America's Finest!
GOULD
Industrial Truck Batteries

Always Use Gould-National Automobile and Truck Batteries

GOULD BATTERIES

GOULD-NATIONAL BATTERIES, INC.
Trenton 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

©1956 Gould-National Batteries, Inc.

Standardaire Blower unloads 20 tons of flour in 50 minutes

In the next 50 minutes, this one operator will have unloaded twenty tons of flour from this huge International Milling Company trailer directly into a baker's storage bins.

The problem of rapidly unloading flour in such quantity, with no leakage, clogging or contamination, was solved by a *Standardaire* blower . . . the only blower found capable of meeting all the specific requirements involved.

This blower (shown in the front of the van) occupies a floor space of only 26″ x 21¾″. When driven by a 20 hp motor it provides an air flow sufficient to move flour as far as 125 feet in any direction . . . including straight up.

Today, due to its proved satisfactory performance, International Milling Company, Minneapolis, one of the largest millers of bakery flour in America, has equipped its entire fleet of bulk flour trucks with *Standardaire* blowers.

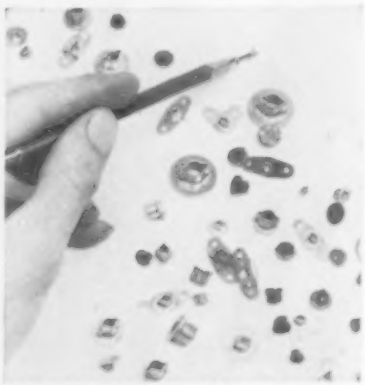
A *Standardaire* blower will deliver more air, with less power consumption, than any other unit of equal size or weight. Find out about its many advantages. Write for bulletin B-154 today.

READ STANDARD
CORPORATION

BLOWER-STOKER DIVISION
370 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

FACTORY / EQUIPMENT NEWS
Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.



79—Self-Locking Metal Nuts, for screw sizes ranging from #4 through 5/16 in., can be re-used repeatedly without impairing their locking ability. Easily installed with standard tools (pliers and hex wrenches) for many assembly applications. Vibration-proof. *Con-Torq, Inc.*

80—Lubricating Unit supplies air-actuated feed mechanisms, chucks, clutches, brakes, and other air-operated parts of machine tools with filtered air, regulated air pressure, and Micro-Fog (fine airborne oil fog) lubrication. Small, compact unit. *C. A. Norgren Co.*

81—Shorted Turns Indicator tests coils for shorts and open circuits in one fast, simple operation before assembly. Gives positive "go-no-go" indication for production testing, incoming inspection, and laboratory use. Adjustable sensitivity. *B & K Mfg. Co.*

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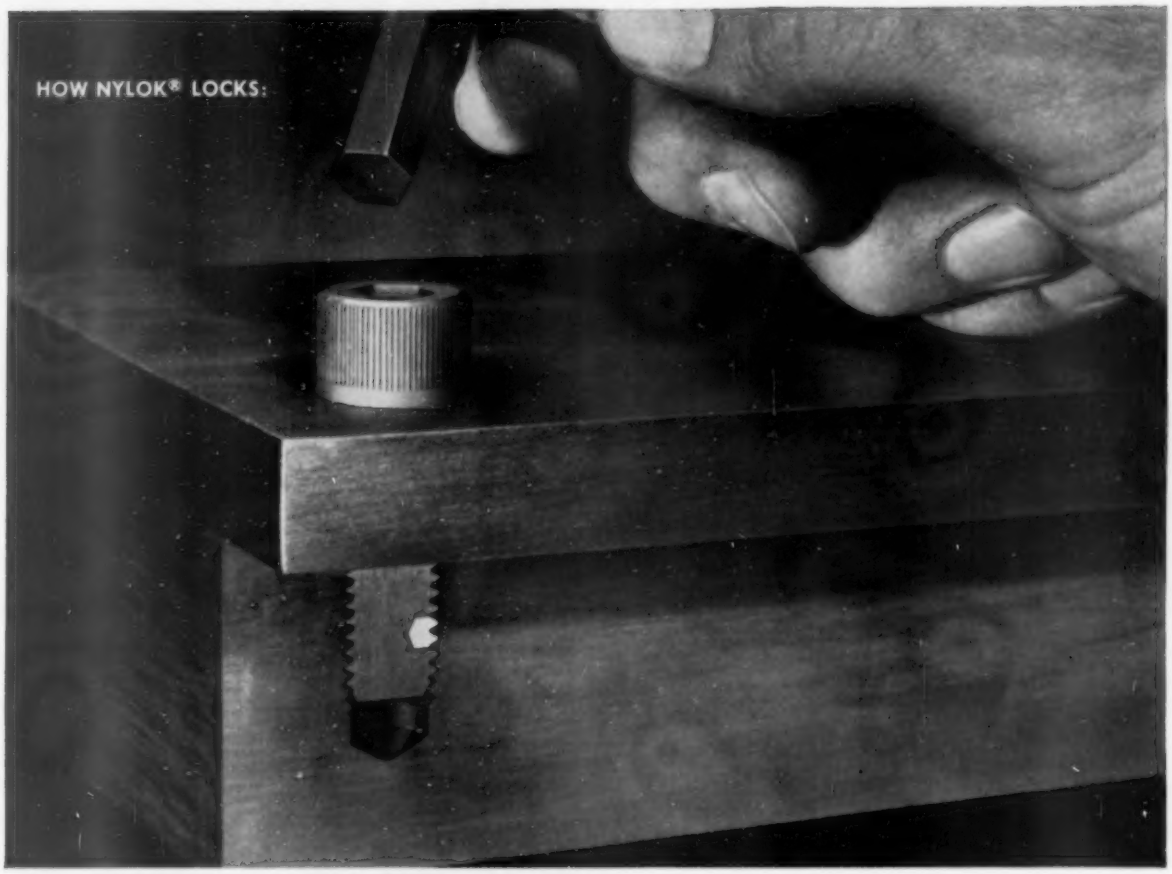
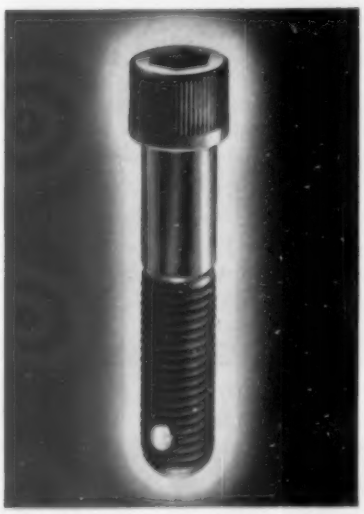


LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together and locks the screw securely.

NEW—self-locking UNBRAKO socket head cap screws



Self-locking UNBRAKO socket head cap screw.

They won't work loose. And they simplify design and save production time.

UNBRAKO socket head cap screws are now available embodying the Nylok* self-locking principle. Nylok provides the first truly practical solution to the problem of making cap screws self-locking.

An UNBRAKO cap screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the UNBRAKO into any tapped hole. *Seated or not*, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not work loose.

You save production time when you make products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. And in many cases you will save weight and mass by using shorter screws in tapped holes instead of drilling through and using nuts and lockwashers.

Self-locking UNBRAKOS are reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, when screws are properly seated, the locking pellet also functions as a liquid seal.

A complete line of self-locking UNBRAKO socket screw products, in a wide range of standard sizes, materials and finishes, is available through your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 11, Pa.

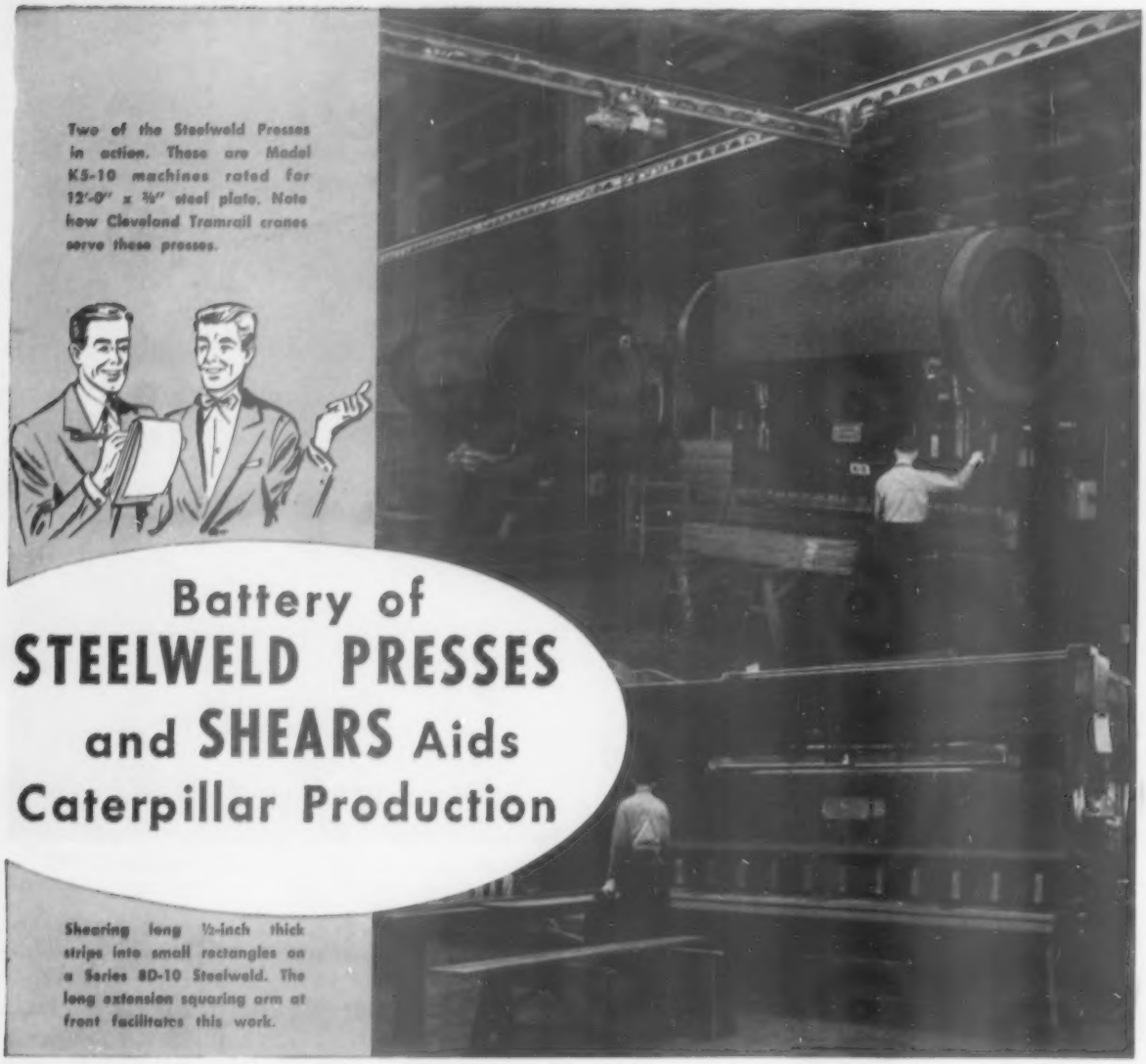
**T.M. Reg. U.S. Pat. Off., The Nylok Corporation*

STANDARD PRESSED STEEL CO.

UNBRAKO SOCKET SCREW DIVISION

SPS

JENKINTOWN PENNSYLVANIA



Two of the Steelweld Presses in action. These are Model K5-10 machines rated for 12'-0" x ¾" steel plate. Note how Cleveland Tramrail cranes serve these presses.

Battery of STEELWELD PRESSES and SHEARS Aids Caterpillar Production

Shearing long ½-inch thick strips into small rectangles on a Series 8D-10 Steelweld. The long extension squaring arm at front facilitates this work.

THOUSANDS of tons of steel of different thicknesses are sheared and formed on Steelweld Shears and Presses into various shapes required for the large volume of tractor equipment produced at the new Joliet, Illinois, plant of Caterpillar Tractor Co. These items include scrapers, rippers, bulldozer blades and wagons.

The heavy construction of Steelweld machines and many high quality features with which they are provided make possible continuous trouble-free performance. Their design includes a number of innovations which ease operation, speed production and enable accuracy to close tolerances.

The fact that Caterpillar has bought Steelweld Shears and Presses repeatedly and now has a large battery of them is mute testimony to the satisfaction they are giving.

GET THESE BOOKS!

Catalogs No. 1010 (Presses) and No. 1011 (Shears) give construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

3250 EAST 281st ST. WICKLIFFE, OHIO

STEELWELD

PRESSES and SHEARS

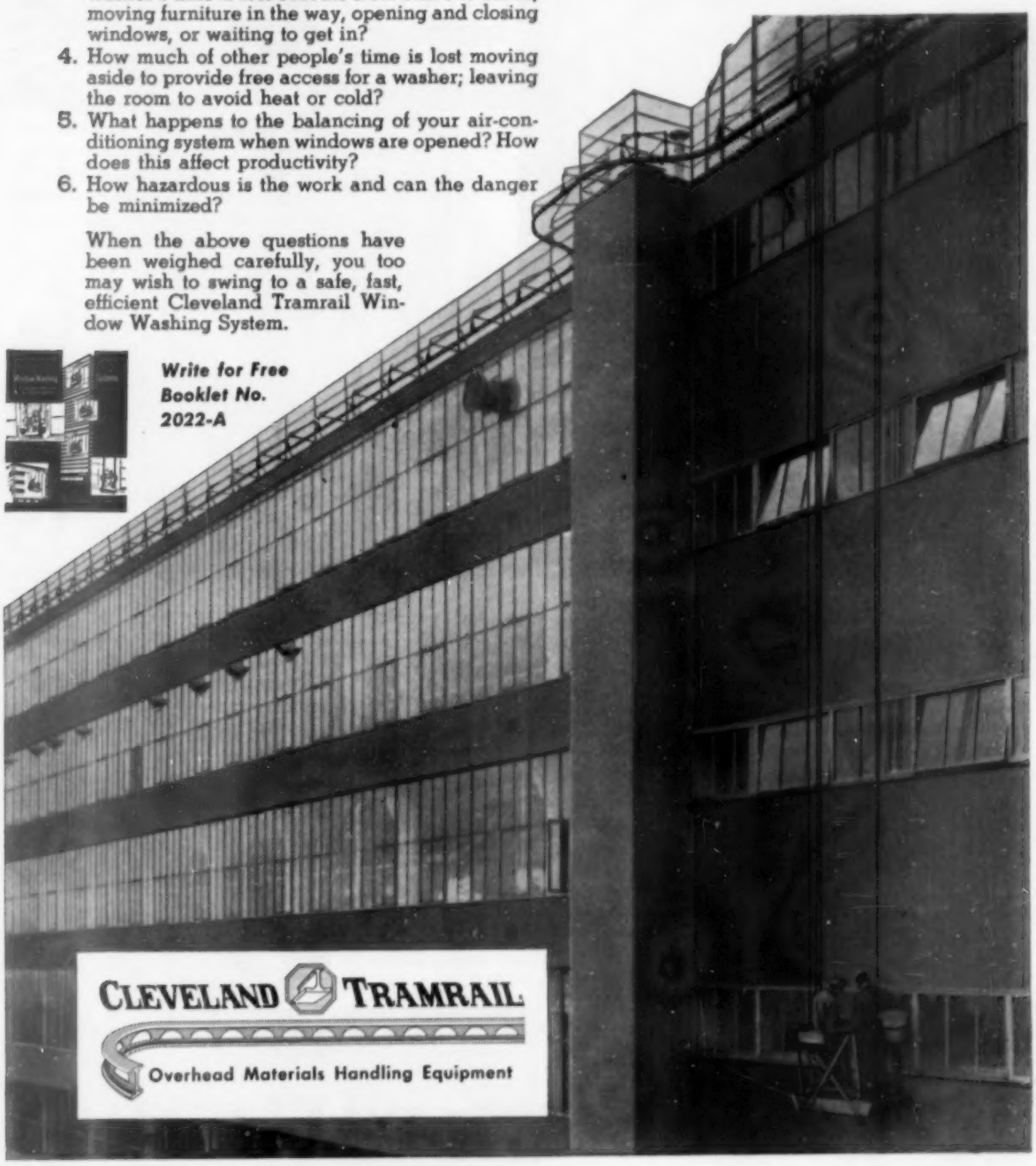
Ponder these Questions
ON WINDOW WASHING

1. How many square feet of glass can a man wash per day?
2. When working from the outside, how much time is lost in reaching windows?
3. When working from the inside, how much of a washer's time is lost enroute from office to office, moving furniture in the way, opening and closing windows, or waiting to get in?
4. How much of other people's time is lost moving aside to provide free access for a washer; leaving the room to avoid heat or cold?
5. What happens to the balancing of your air-conditioning system when windows are opened? How does this affect productivity?
6. How hazardous is the work and can the danger be minimized?

When the above questions have been weighed carefully, you too may wish to swing to a safe, fast, efficient Cleveland Tramrail Window Washing System.

Write for Free Booklet No. 2022-A

A Cleveland Tramrail Window Washing System enables one or two men to reach and clean entire walls of windows with safety. The special cage is suspended from an overhead carrier that travels on a track attached to the building. This equipment is also helpful for pointing up, painting and minor repairs.

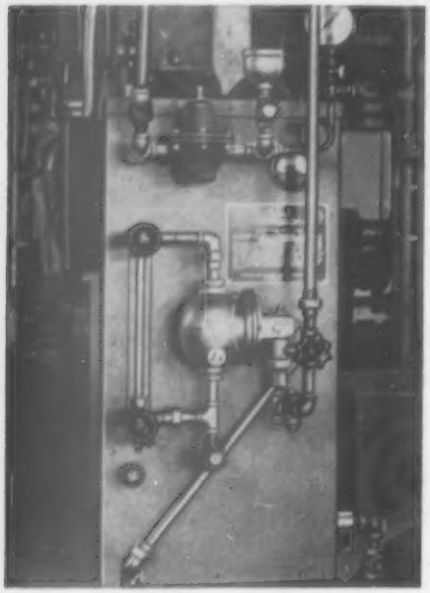


CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

THE CLEVELAND TRAMRAIL DIVISION • CLEVELAND CRANE & ENGINEERING CO. • 3213 E. 290 ST. • WICKLIFFE, OHIO

Pantex Speedylectric Steam Generator



UL Listed
ASME Code

Ideal Steam Source for Pilot, Lab and Test Work

permits precise control of pressure and quality . . . eliminates operator, odor, fumes, fire hazard

Industry uses this "extra" steam boiler in many ways to facilitate production, reduce costs and eliminate fire and explosion hazards. For pilot operations, laboratories and tests the Speedylectric Steam Generator often proves the only answer to steam needs.

It can be installed right in a laboratory, for it requires little space and practically no attention or maintenance. It is silent, odorless, free from fumes and hazards of fire or explosion. It exactly and automatically maintains any desired pressure, and constant quality 98 per cent dry steam. Utilizing the Speedylectric electrode principle, it generates steam electrically, at surprisingly low cost. Capacities from 2 to 60 Bhp; 15 to 500 Psi; for 220, 440, 550 volts AC. USE COUPON to get complete details.

Speedylectric Steam-Jet Cleaner lets one man do the work of five. High pressure jet of dry steam and solvents quickly removes grease and dirt accumulations from machines and equipment without flooding floors. No need to stop nearby production or move machines outside. Completely safe and portable.

PANTEX MANUFACTURING CORPORATION
Box 660H, Pawtucket 11, R. I.

Send me facts and figures on:

☐ Pantex Speedylectric Steam Generator
☐ Pantex Speedylectric Steam-Jet Cleaners

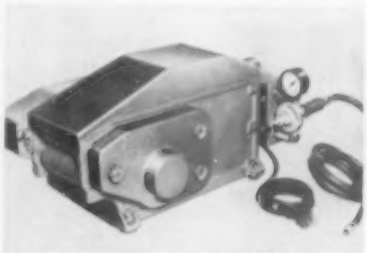
Name and Title _____

Company _____

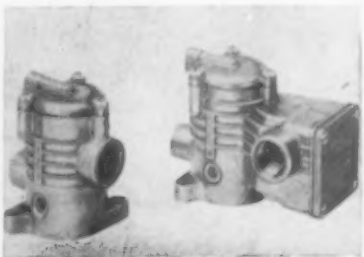
Address _____

For more about these products, circle item numbers on Reader Service card next to back cover.

82—Bin-Type Floor Trucks, non-corrosive, are ideal for textile, chemical, paper manufacturing, and food processing plants. Made of stainless or galvanized steel or aluminum; available in many sizes. Corrugated self-drain bottom optional. *Lewis-Shepard Products, Inc.*



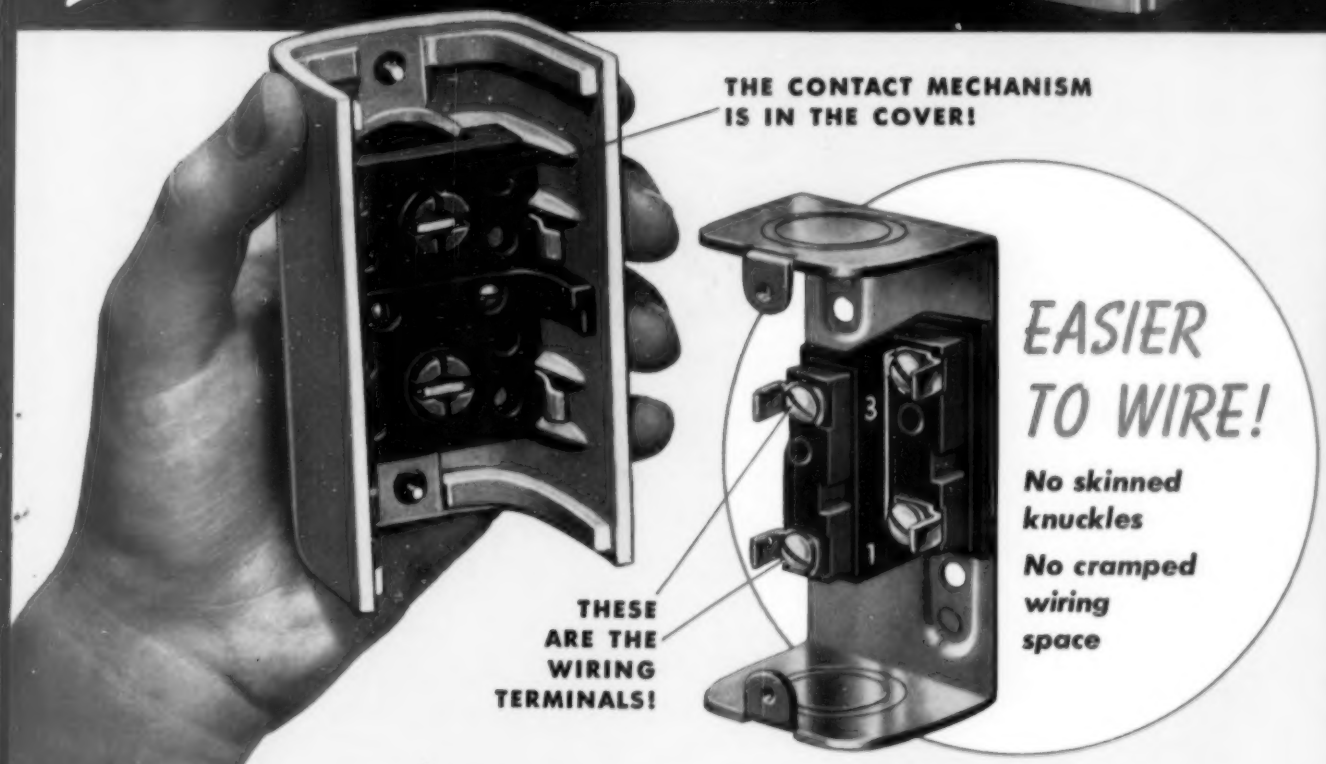
83—Air-Operated Tape Dispenser has no pushbuttons, levers, or foot pedals. When operator removes a length of tape, microswitch automatically sets in motion the next delivery cycle. Handles pressure-sensitive tape up to 4 in. wide, 21 in. long. *Air Fixtures, Inc.*



84—Small Solenoid Pilot Valves, 2- and 3-way types are for use in laboratories and on precision production equipment that requires accurate control and quick response. Capacities range up to 23.8 cfm. air and 3.8 gpm. hydraulic; up to 600 cycles per min. *Valvair Corp.*

Turn the page

Brand New Idea in STANDARD-DUTY STATIONS



EASIER TO WIRE!

No skinned knuckles

No cramped wiring space

Here's an entirely new idea in push button stations—a wrap-around cover—with the contact mechanism part of the cover. Removing the cover exposes the terminals for instant and easy wiring. Strong, spring type, silver plated contacts connect the push button assembly in the cover with the terminals in the base.

Matching ribs in the cover and notches in the terminal blocks assure that the wiring connections are always correctly made. A bakelite shield protects the contact mechanism and prevents careless wiring from interfering with the contact operation. Concentric knockouts are provided in both top and bottom of the heavy metal base.

You will want to know about this new standard-duty station because—it is good looking—it takes less time to install—it was designed for the convenience of the installation engineer.

Let us show you a sample of this "brand new idea" in standard-duty stations!

A-B Quality

ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

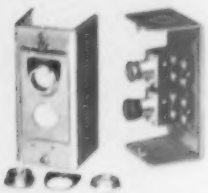
Bulletin 800 standard-duty push button stations can be supplied with one, two, or three buttons, or as a selector switch. Also available with pilot light. Furnished only in NEMA Type 1 enclosures.

9-56-MR

Also... NEW HEAVY-DUTY PUSH BUTTONS

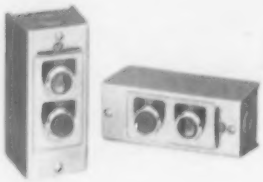
BULLETIN 800

NEW FLEXIBILITY!



You can assemble any special heavy-duty station from a small stock of standard push button, selector switch, and pilot light components. There is no need to wait for long delivery of your special stations.

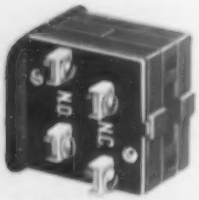
Stations can be arranged for either vertical or horizontal mounting. Name plates can be rotated to any position, replaced with any standard marking, or removed entirely.



NEW ENCLOSURES!

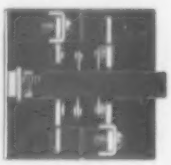
Each button, selector switch, or pilot light is a self-contained unit which can be mounted in attractive new enclosures. Standard enclosures accommodate up to eight units, but enclosures can be furnished for larger numbers.

NEW CONTACT BLOCK!



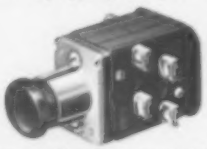
Above: View of contact block, showing terminals for normally open and normally closed contacts. Right: Contact block, with cover removed, showing stationary silver alloy contacts and pushrod carrying the moving contacts.

Bulletin 800 heavy-duty push buttons have the same molded contact blocks that have proved so dependable in Bulletin 800T oiltight push buttons, although they are not themselves oiltight. And all of them are equipped with double break, silver alloy contacts.



NEW OPERATORS!

Operators, which mount on the contact block, are available in many types, and push buttons come in various colors.



Type AK2B flush head START button

Type DK6A mushroom head button

Type PK16 pilot light with transformer

Type EK11B cylinder lock unit

9-56-MR

A-B Quality

ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

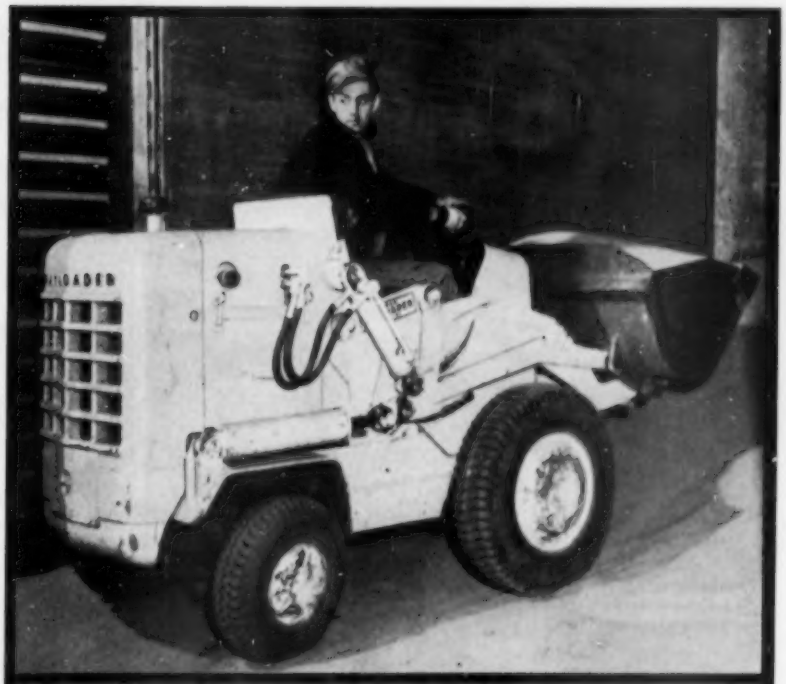
For more about these products, circle item numbers on Reader Service card next to back cover.

85—Centrifugal Fans, for heavy-duty applications, come in a wide range of sizes for volumes up to 1,000,000 cfm. Low operating cost; operate at mechanical efficiency over 92%, static efficiency over 88.5%. Cone with single or double inlet. *American Blower Corp.*

86—Floor Machine features an explosion-proof motor (¾-hp. repulsion-induction type) for safe operation in Class 1, Group D, hazardous locations. Other specs: 165-lb. weight; 17-in. brush; 160-rpm. brush speed; heavy-duty transmission. *General Floorcraft, Inc.*

87—Phone-Equipped Headset provides clear communication between workers in noisy areas, plus ear protection. Suspension-type unit, equipped with standard jack, can be connected to plant intercom or radio systems, telephones, special circuits. *Mine Safety Appliances Co.*

Turn the page



saves $7.00 per ton on shipping costs

The purchase of a new-model "PAYLOADER" tractor-shovel enabled an Ohio plant to receive its molding sand in boxcars at a saving of $7.00 per ton — a saving sufficient to pay for the unit in a year. But boxcar unloading is only a part-time task for this "PAYLOADER". Its regular work is the handling of tons of sand, steel scrap, waste and refuse in daily foundry operations.

This Model HA with a bucket capacity of 18 cu. ft. (2,000 lbs.) is the smallest of a complete line of "PAYLOADER" tractor-shovels that range up to 2¼ cu. yd. (7,500 lbs.). Lift forks, sweepers and other attachments are available for the Model HA to increase its usefulness. There's a nearby Distributor ready to demonstrate what a model HA or a larger "PAYLOADER" can do for you.

THE FRANK G. HOUGH CO., 755 Sunnyside Ave., Libertyville, Ill.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Send full PAYLOADER® data on

- ☐ Four-wheel-drive sizes ½ to 2¼ cu. yd.
- ☐ Rear-wheel-drive ½ to 1 cu. yd.
- ☐ Front-wheel-drive 1¼ cu. ft. to ½ cu. yd.

Name
Title
Company
Street
City
State
F

NEW LOW-COST WAY TO CLEAN SHELL-MOLDED CASTINGS

1000 to 1500 shell-molded camshaft castings cleaned per hour at large automotive foundry. Four Sly-Jet Blast blower units—two on each side—are positioned to clean 24-inch long castings. Fast continuous flow from mold-making to machining is assured; Sly-Jet Blast is integral part of handling system. Sly Dynaclone filter keeps area dust-free.

NEW SLY-JET BLAST

Eliminates need for air compressor . . . Eliminates maintenance costs of airless wheels

Now, clean shell-molded castings faster, at lower cost. With new, *low-velocity* Sly-Jet Blast, cleaning action is thorough yet "gentle"— therefore, no pitting, no removal of parent metal, no warping or distortion as with other cleaning methods. *Efficient*—abrasive is accurately directed over a large work area through a stationary nozzle, which can be set at any angle from horizontal to vertical. *Economical operation*—blower unit is powered by electric motor; there is no compressor, no need for high horsepower. *Long, trouble-free operation*—there are no moving parts in the blast zone; abrasive is introduced directly into the nozzle. *Versatile*—nozzle opening can be in any shape from circular to rectangular and any size. Abrasive can be any grade of sand, most grades of grit. *Non-stop operation*—cleaning mechanisms can run continuously for effective integration in continuous-flow handling systems.

Take the problem and expense out of cleaning shell-molded castings. Write today for the facts on new Sly-Jet Blast.

THE W. W. SLY MANUFACTURING CO.

SINCE 1874

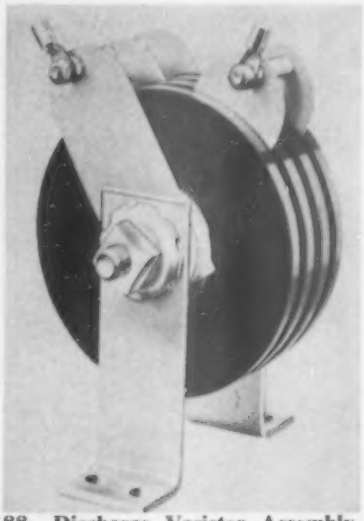
4755 TRAIN AVENUE • CLEVELAND 1, OHIO

OFFICES IN PRINCIPAL CITIES

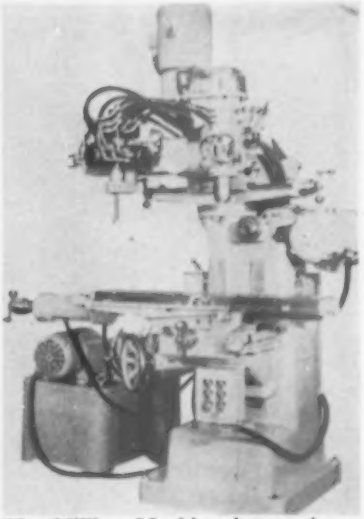
FACTORY / EQUIPMENT NEWS

Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.



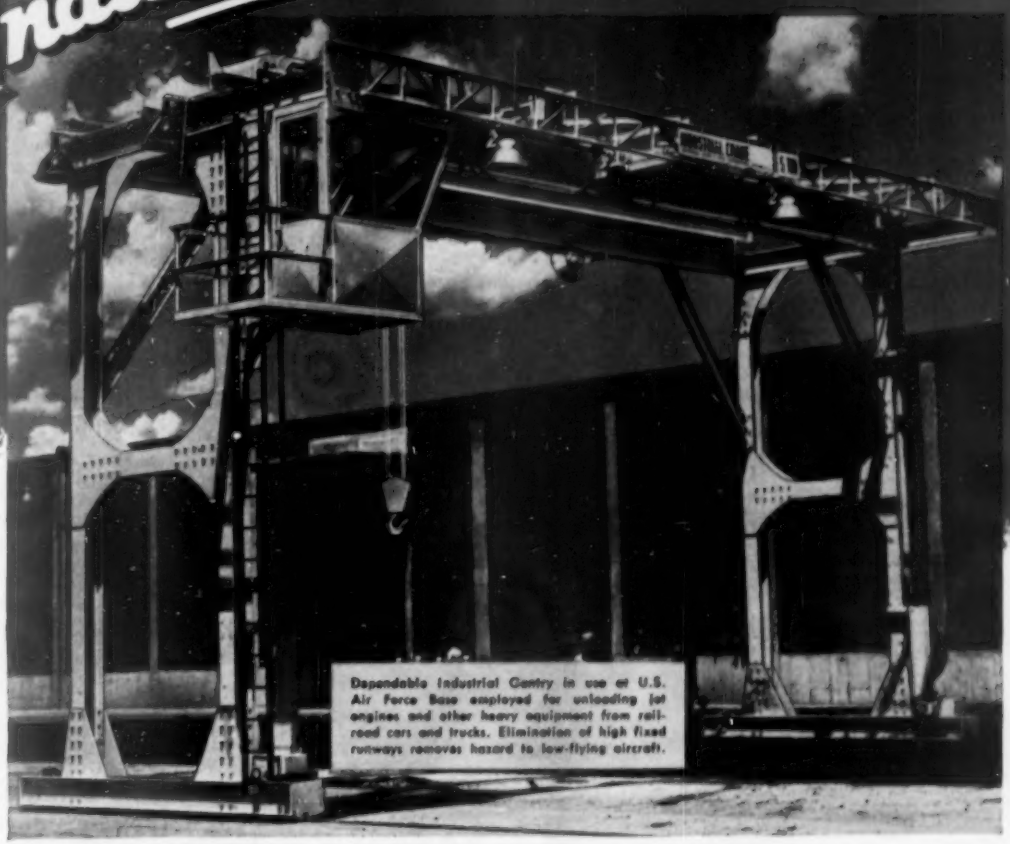
88—Discharge Varistor Assembly, ready-mounted for direct installation in electrical circuits, is used to protect motors, generators, lifting magnets, magnetic chucks, solenoids, relays, large coils, etc., against high inductive surges. 6-in. dia. disk. *General Electric Co.*



89—Milling Machine has a three-dimensional hydraulic duplicator for making duplicate molds and dies or contour milling to templates. Only 4 oz. of stylus pressure required to accurately reproduce a metal, plastic, or wood master. Turret rotates 360 deg. *Axelson Mfg. Co.*

Turn the page

Industrial GANTRYS CUT HANDLING COSTS



Dependable Industrial Gantry in use at U.S. Air Force Base employed for unloading jet engines and other heavy equipment from railroad cars and trucks. Elimination of high fixed runways removes hazard to low-flying aircraft.

Industrial Gantrys furnish all the "lift" you need to unload flatcars, gondolas and trucks with speed, safety and economy.

Industrial Gantrys are ideal where travel is long and where fixed overhead runways are undesirable. Gantrys are often the lowest cost crane installation where extremely long runways are necessary as in yard storage.

Industrial Gantrys are frequently used in warehouses and other industrial buildings where the supporting structure is not sufficiently rugged to permit the operation of a heavy duty overhead crane.

Industrial Gantrys are ruggedly-built, dependable, smooth-operating cranes — often the economical answer to many materials handling problems. Consult with Industrial for the most practical answers to your materials handling problems.

Designers and Builders of Overhead Cranes, Jib Cranes, Gantrys and Monorail Systems.

IG 1156-C

INGERSOLL B-W BORG-WARNER

INDUSTRIAL CRANE & HOIST

Ingersoll PRODUCTS DIVISION

BORG-WARNER CORPORATION

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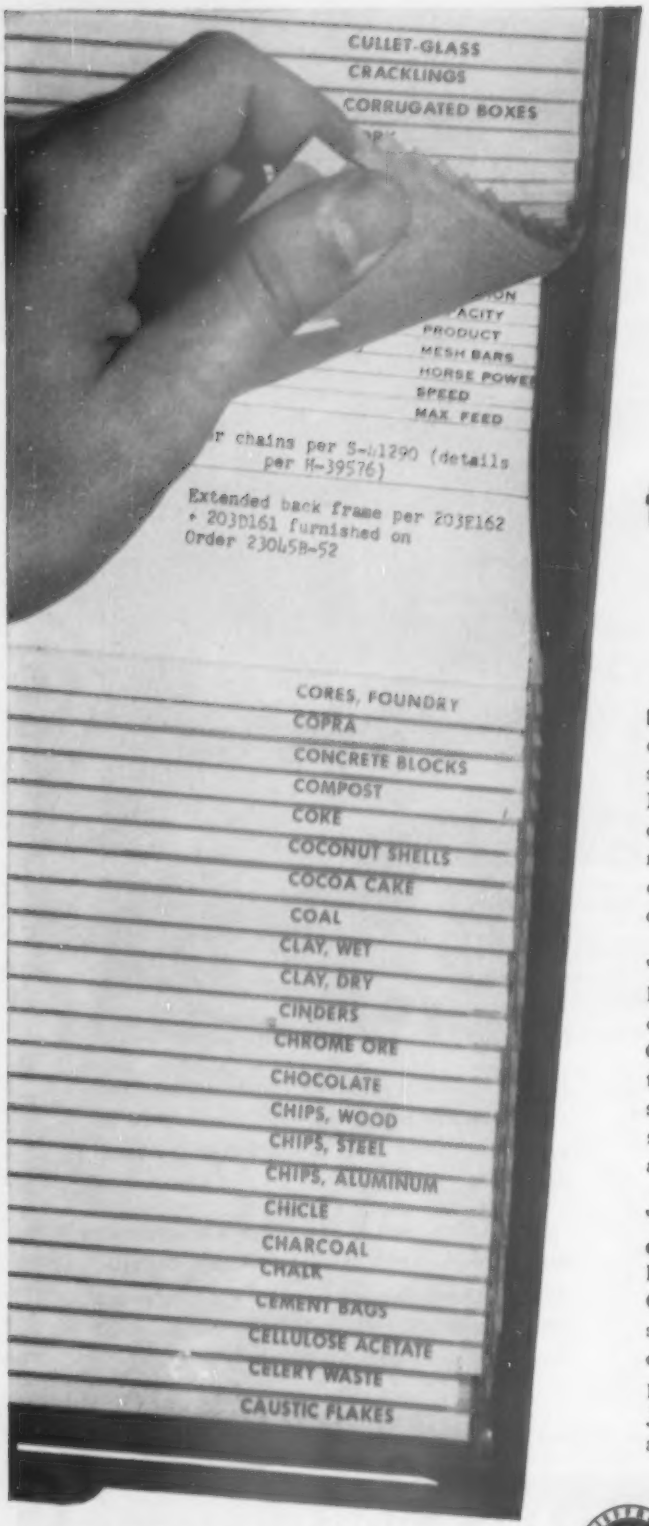


"what type of Crusher, Pulverizer, Shredder or Grinder do we need?"

you'll find the answers here in Jeffrey's files

During the past 60 years, Jeffrey reduction equipment has handled almost every conceivable substance, including many you'd never imagine. Our Reduction Engineers have in their files the history of all tests run on these materials, plus performance records on the machines sold for their reduction. You can check with Jeffrey and make sure of reduction equipment performance *before* you sign the order.

"But my product's new." Jeffrey's modern testing laboratory is completely equipped to determine the correct type and size of machine for a given task. Only a small amount of material is required for testing. You may witness the experiments, and results are held in strict confidence. All tests using standard equipment are made without charge to a customer.

"What machine will give us maximum efficiency and economy of operation?" The long, complete line of Jeffrey Crushers, Pulverizers, Shredders and Grinders enables us to give you the machine best suited to your specific needs. In most cases, standard equipment is recommended, with special internal parts where they are necessary. You can count on Jeffrey engineers to give you reliable and unbiased advice on crushing problems.

There is no substitute for know-how. *An outline of your reduction problems is all we need to submit recommendations. Write The Jeffrey Manufacturing Company, Columbus 16, Ohio.*

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

For more about these products, circle item numbers on Reader Service card next to back cover

90—Tank Adapter can be used in combination with any portable, heavy-duty vacuum cleaner having a 1½-in. hose, for large-volume metal recovery, furnace and boiler cleaning, dozens of other uses. Fits any 30-gal. or smaller ash can or drum. *Clarke Sanding Machine Co.*

91—Casters, with semi-steel V-groove wheels, will operate on angle steel track as well as floor surfaces. Both swivel and rigid models with 6x2-in. and 8x2¾-in. wheels, all equipped with roller bearings and pressure grease fittings. *The Hamilton Caster & Mfg. Co.*

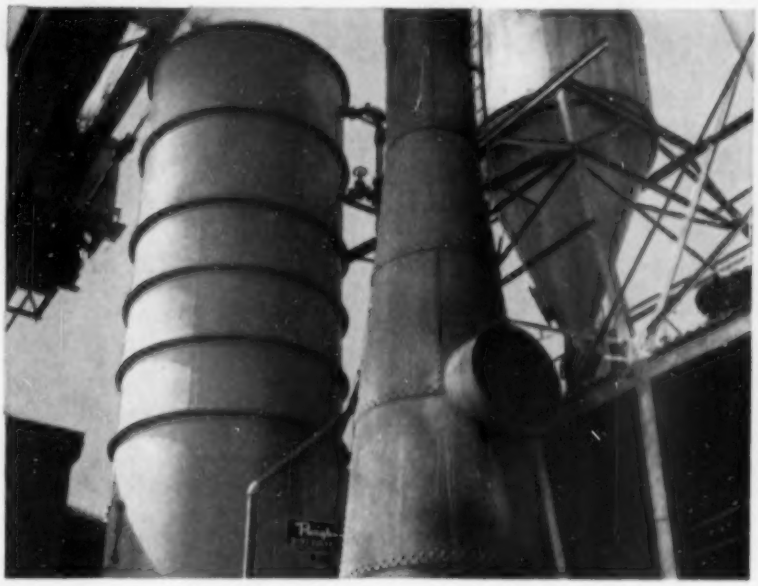
92—Mercury Lamps, 400-watt A-H1 series, have tough, hard glass bulbs. They're weatherproof, withstand fluid splatter and industrial gases, for heavy indoor and outdoor service; also proof against crazing or cracking in normal service. *Westinghouse Electric Corp.*

Turn to page 232

Cleveland Trinidad votes for new

Pangborn WET DUST Collector

and now makes a clean sweep of over $50 a day!



Dust control at the Cleveland Trinidad Paving Co., Cleveland, Ohio, is necessary for efficient operation, good employee and community relations and the salvage of valuable material.

To achieve these ends, the company uses a combination of preliminary centrifugal collectors and secondary centrifugal wet collector, resulting in a salvage of materials valued at $50 per day. Cleveland Trinidad says, "This Pangborn Collector has been a very profitable investment. We investigated all types of wet dust collectors and picked Pangborn's as the best of the lot. We've had no trouble at all with this machine and will be delighted to recommend it to anyone."

Pangborn CONTROLS DUST

How do you Vote?

CAST YOUR BALLOT

☐ **Please send me more information on Pangborn Dust Control immediately.**

If you're interested in efficient, profitable plant operation, cast this "ballot" for additional information on Pangborn Dust Control. Send to Pangborn Corp., 2100 Pangborn Blvd., Hagerstown, Md.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

PREVENTIVE MAINTENANCE REPORT:

Drive Costs Reduced $600 through Dayton Preventive Maintenance and Cog-Belts*

CAUSE OF COST REDUCTION: *Flexibility of Cog construction dissipates heat faster, makes V-Belts last up to 6 times longer.*

PLANT: *E. L. Bruce Co., World's Largest Manufacturers of Hardwood Flooring.*

Details: Standard "A" section V-Belts were used to drive 24 polishers on each of six continuous operation conveyor lines — 144 drives in all — in the Prefinish Dept., Memphis Plant. Due to the necessity for extremely small motor sheaves to reduce motor speed to slow polishing speed, standard V-Belts wore out within 2 weeks to 2 months.

The problem was discussed with F. Tanner, Power Transmission Dept., Memphis Bearing and Supply Co. — the local Dayton V-Belt distributor. He recommended Dayton Cog-Belts specifically for their extra-flexible, heat-dissipating Cog design.

Dayton Cog-Belts were test run on two lines (48 drives) operating continuously 8 hours a day, 5 days a week for one year. Regular maintenance checks were made as a part of the Dayton Preventive Maintenance Program initiated together with the change to Dayton Cog-Belts.

Test Result: Dayton Cog-Belts consistently lasted longer. The greater majority lasted the full year. Savings during test period — $200 in V-Belts alone.

Based on the success of this test Dayton Cog-Belts were made standard replacement for drives on all six conveyor lines. Second year savings amounted to more than $600.

Conclusion: Dayton Cog-Belts showed themselves to be superior on this particular drive application. We have since used them very successfully and economically on other applications involving unfavorable, difficult drive conditions. Service life generally increased 2—3 times.

L. Wes Jones,
Maintenance Engineer

Dick Hicks
Ass't. to Plant Mgr.

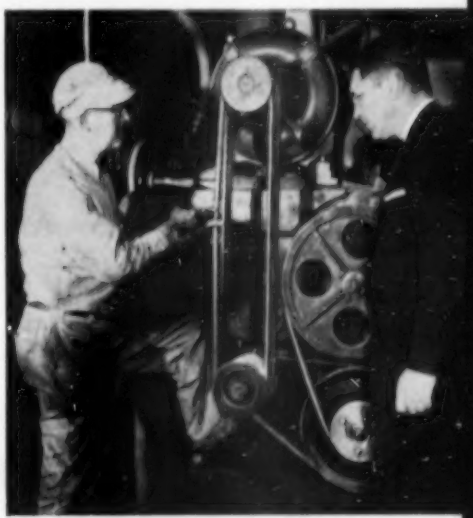
*T. M.
© D. E. 1956

This is only one of the many instances in which Dayton Cog-Belts, with the patented, molded Cog design, and Dayton PM have drastically reduced V-Belt costs. In many cases they have saved thousands of dollars in downtime through dependable, trouble-free power transmission. For more information or help in solving your power transmission problems consult your Dayton Distributor or write direct to Dayton.

Sections of two of the E. L. Bruce Company's six conveyor lines on which tongue-and-groove hardwood flooring is sanded, waxed, polished and baked—completely readied for installation. Note 2¼" diameter driver requiring V-Belt flexibility obtainable only in Dayton Cog-Belts. Infra-red lamps (not shown) multiplied heat build-up in standard V-Belts. Cog construction provides superior heat dissipation. V-Belt savings alone run more than $600 per year.

"It's a relief to know I can put Dayton Cog-Belts on a tough drive like this rip saw and except for Preventive Maintenance checks, forget them for 2—3 years." Hess Jones, Maintenance Engineer at E. L. Bruce Co., puts his thanks to Felix Tanner, who first recommended using Dayton Cog-Belts.

"Lowest cost per production hour is what we're interested in — and on this polisher drive Dayton Cog-Belts give us just that," according to Mr. Nick Hicks, Assistant to the Plant Manager at E. L. Bruce, shown talking to Felix Tanner and H. J. Billings.



Dayton Rubber *World's Largest Manufacturer of V-Belts*

DAYTON RUBBER COMPANY, INDUSTRIAL REPLACEMENT DIVISION, DAYTON 1, OHIO

Start Right

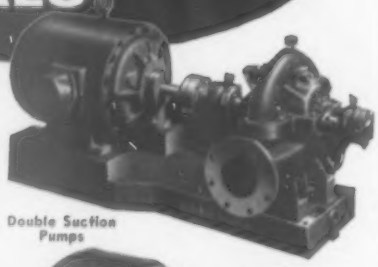
WITH THE RIGHT PUMP!

here's how to pick it from the top line of pumps for every service

"BUFFALO"

CLEAR WATER JOBS

Do you plan to handle large volumes, medium pressures, for air washing, air conditioning, general water service? Your most efficient and satisfactory choice is a "Buffalo" SL Double Suction Pump. Capacities to 14,000 gpm. Write for Bulletin 955. And where *space is short*, a "Buffalo" Close-Coupled Pump will give you excellent service in capacities up to 1100 gpm. Write for Bulletin 975. However, where you're handling *real pressure—up to 1500 feet*, as in boiler feed—a "Buffalo" Multistage Pump will give you the performance you want.

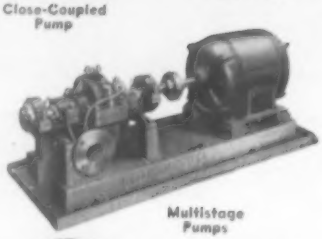


Double Suction Pumps

Close-Coupled Pump

CHEMICAL LIQUIDS

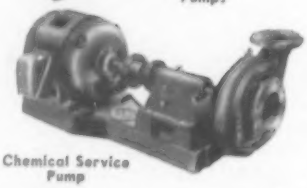
Husky "Buffalo" Single Suction Chemical Pumps are available for almost any chemical liquid a pump can handle—from acetic acid to zinc sulphate. These are built in a wide choice of trim, as well as rubber-lined for highly corrosive chemicals.



Multistage Pumps

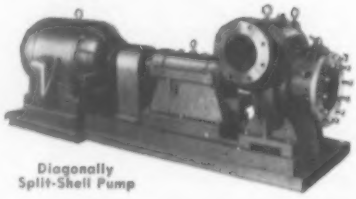
PAPER STOCKS

"Buffalo" builds efficient, long-lived pumps for every job in the mill. These range from Diagonally Split-Shell Pumps for high consistency stocks to rubber-lined models to solid shell pumps for agitation, etc. All are described in Bulletin 953.



Chemical Service Pump

IN EVERY "BUFFALO" PUMP, you get a "plus" value—the "Q" Factor—the built-in Quality that means trouble-free satisfaction and long life. 79 years of hydraulic experience back up your choice of "Buffalo" as a top pump value.



Diagonally Split-Shell Pump

"Buffalo" PUMPS

BUFFALO PUMPS

DIVISION OF BUFFALO FORGE COMPANY

471 BROADWAY • BUFFALO, N.Y.

Canada Pumps, Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

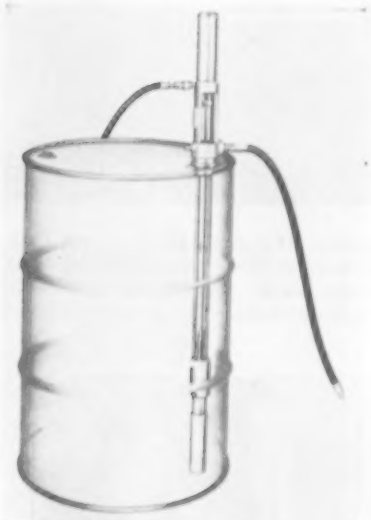
A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

FACTORY / EQUIPMENT NEWS

Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back page.

93—Electric Fork Truck is a stand-up, center-control, 10,000-lb. model. New R10T features front-wheel drive, rear-wheel steer; has a travel speed of 4.5 mph. without load, 4 mph. with full load. Has four speeds forward and reverse. *The Elwell-Parker Electric Co.*

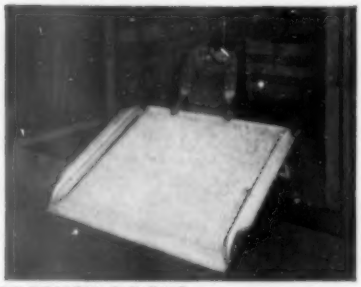


94—Paint Pump, for handling all paints and solvents, can be incorporated into spraying systems using any number of colors or spray outlets. Delivers paint at rate of 3 gpm. through 3 separate tubes. Air motor sealed from paint being pumped. *Stewart-Warner Corp.*

95—Bin-Level Indicator serves in hazardous atmospheres to indicate or control the level of any bulk material that will flow—from light aerated powders to heavy abrasive or lumpy matter. Suitable for applications on bins under pressure or vacuum. *The Bin-Dicator Co.*

Turn the page

WHICH OF THESE DOCK LOADING PROBLEMS IS YOURS?



☐ **TRUCK DOCK?**

Magliner dock boards meet today's cost-saving requirements for fast, efficient truck-trailer loading. Boards are magnesium-light for safe, easy one man handling.

☐ **RAIL DOCK?**

Curved tracks, reefer cars, varying dock-to-car spans, door widths, etc. All pose specific problems—quickly solved with a Magliner dock board.

☐ **MULTI-STATION LOADING?**

Magliner Perma-Docks—a permanently installed leveling system . . . recessed into dock. One man easily raises or lowers board. Power operation optional.

☐ **CROWDED, NARROW DOCK?**

Magliner flared dock boards permit sharp turns in crowded, narrow areas.

☐ **GREAT HEIGHT DIFFERENCES?**

Board-and-ramp combination lengthens slope, reduces grade. Board may be used independently.

☐ **GROUND LEVEL PLANT?**

Magliner Mobile Loading Ramp services rail cars or truck trailers. A loading dock on wheels. One man moves it!

You can quickly, safely and easily solve it with a MAGLINER Magnesium Dock Board!

Is one of these loading problems yours? They are typical examples of how Magliner magnesium dock boards have provided practical cost-saving solutions to thousands of difficult dock problems.

Every dock is different . . . No two loading problems are exactly alike. Many variable factors, such as equipment, loads, plant layout, operating conditions, etc.—determine which Magliner dock board will meet *your* specific requirement, and do your job best! Whichever Magliner dock board is recommended for your operation, it will speed loading . . . get more out of power trucks and other loading equipment . . . keep costs down and output up! It will have all the outstanding design and construction advantages which have made Magliner a recognized authority in this highly specialized field.

Magliner dock boards are light . . . strong . . . safe! Made of magnesium for easy, one man handling, they safely handle loads up to 20,000 lbs., protect men and equipment against accidents and costly damage.

A low-cost investment, Magliner dock boards provide dependable, long-life service with less maintenance, and will pay you big dividends over a long period of time. Ask for the facts today—***write for Bulletin DB-204.***

MagLiner MAGNESIUM DOCK BOARDS

MAGLINE INC. • P. O. BOX 711 • PINCONNING, MICH.

Canadian Factory: Magline of Canada, Ltd., Renfrew, Ontario

Faultless CASTER FACTS

CHANCE VOUGHT AIRCRAFT, DALLAS, PROTECTS EMPLOYEES ON MOBILE SCAFFOLDS WITH FAULTLESS DOUBLE LOCKING CASTERS

A completely safe, stable, and mobile work scaffold is being used by Chance Vought Aircraft, Dallas, in conjunction with precision assembly work on F7U-3 Cutlass frames and engines. Chance Vought's Plant Engineering, Safety and Maintenance Departments attacked this problem with the aid of Faultless engineers, and selected the Faultless F900 Series scaffold caster, which had been sampled, tested and approved. Combining a well designed scaffold with the Faultless F900 Double locking Casters has resulted in the development and use of equipment that easily meets all their requirements.

PROTECTS WORKERS ON RACKS, LADDERS, SCAFFOLDS, PLATFORMS

The Faultless F900 Series is designed with an easy-to-use foot-operated brake lever which simultaneously locks both swivel and wheel. It is thus possible to greatly simplify the design and increase the safety of the scaffolds. Brake shoe compensates for wheel wear to insure full braking action at all times.

Do YOU have a work platform problem? Our experienced engineers will gladly provide you with helpful caster data if you simply phone or write, no obligation.

SERIES F900 MEDIUM DUTY SWIVEL TRUCK CASTER

The F900 Series incorporates precision formed, and hardened double ball bearing swivel construction. The lower raceway is machined from steel bar stock for surplus strength and long life. Shown with Vulcanized Tired Wheel. Available with Semi-Steel, Renewable Tired, Ruberex and Plaskite Wheels.

FAULTLESS CASTER CORPORATION

FAULTLESS SOLVES THE TOUGH JOBS

For more about these products, circle item numbers on Reader Service card next to back cover.

96—Isotope Radiography Machine, the low-cost, portable 50-curie Multitron, utilizes Gamma energy from radioisotopes to detect flaws in castings, welded joints on boilers, pressure vessels, pipelines, etc. Requires no power supply; can be wheeled by one man. *The Budd Co.*

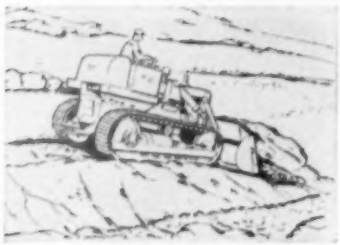
97—Shutoff & Alarm, for automatically controlled heating processes, operates without sensing elements or electronic circuitry. For heat-treating furnaces; other processes involving pressure or flow and using an on-off, 2-position, or pulsing type of control. *Damol Corp.*

98—Cold-Headed Nails made of corrosion- resistant (nickel-base) alloy, are useful in chemical plants, tanneries, pickling baths, plating tanks. Suitable for many applications requiring high strength at high temperatures. Many sizes available. *John Hassall, Inc.*

Turn the page

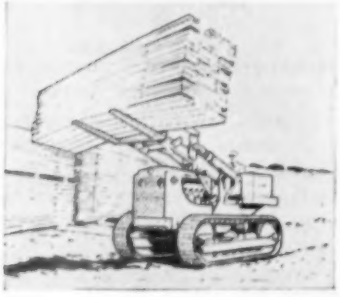
Bucket capacity	1½ cu yd	Net engine hp	72	Weight	19,600 lb

You can mechanize material handling without plant alterations or production shutdowns with an Allis-Chalmers HD-6G



". . . has power to dig hard-packed material."

". . . also handles lumber, pipe or palletized loads."



When you put an Allis-Chalmers HD-6G on the job, it starts moving materials immediately . . . saving time and labor for you right from the start. Its adaptability enables you to fit it in with your present setup. There is nothing to install . . . no time out for plant alterations.

Further, the adaptability that gives you immediate benefits also gives you *continuing* benefits. You can arrange — and rearrange — your storage piles as the situation demands, for you are not confined to the limits of a fixed installation.

The HD-6G is excellent for many materials handling assignments. It has the power to dig into hard-packed materials and the maneuverability to turn in confined areas. There is a fast reverse that increases output by speeding the loading cycle. Its thousand-hour lubrication feature reduces daily maintenance time. Interchangeable attachments quickly adapt it for handling lumber, pipe, packaged or palletized materials.

Ask your Allis-Chalmers Construction Machinery dealer to show you the immediate and continuing benefits you get when you mechanize materials handling with an HD-6G.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

TIMKEN Company ORDERS 2 MORE DIAMOND ITV UNITS

(WIRED TELEVISION)

AFTER 3 SUCCESSFUL INSTALLATIONS

Picture of furnace interior on Diamond ITV viewing screen is watched by remote dispatcher. A flip of a switch and he SEES conditions in another furnace on same screen.

Operator at another control pulpit SEES a visually inaccessible billet loading area for a pusher type furnace.

The Timken Roller Bearing Company made its first application of Diamond Industrial TV in August 1951 for remote observation of the interior of a tube-cooling furnace. Since that time two additional installations have been made to watch (1) the inside of another furnace and (2) the remote handling of billets by a crane. The success of these has resulted in a recent order for two more sets of Diamond ITV.

You, too, probably can use Diamond ITV to substantial advantage. Call your Graybar Distributor or use the coupon below.

7530

Distributed by GraybaR

DIAMOND POWER SPECIALTY CORP.
"FIRST IN INDUSTRIAL TELEVISION"
ELECTRONICS DEPT., P.O. BOX 56RR
LANCASTER, OHIO

Please send me without obligation a copy of new bulletin showing how Diamond Industrial (Wired) Television will help me reduce costs, improve quality, increase sales and aid safety.

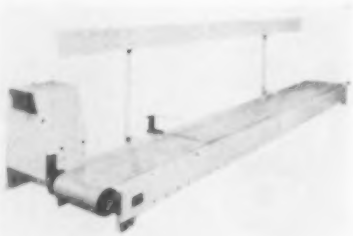
Name_____

Title_____

Company_____

Address_____

For more about these products, circle item numbers on Reader Service card next to back cover.



99—Flat-Belt Bag Conveyor features variable belt speeds and adjustable frame to meet a variety of requirements. Two parts: rear half can be telescoped over front half for a minimum conveying length of 7 ft.; fully extended length is 12 ft. *Richardson Scale Co.*

100—Caster has a lip-type neoprene seal that protects both swivel races and wheel bearings against dirt, grit, water, acids—and the rust produced in plants by chemicals, detergents, or steam sprays. Steel, plastic, V-groove, and molded-on rubber wheels. *The Colson Corp.*

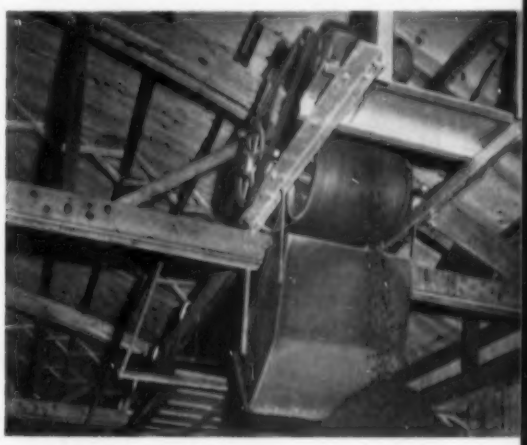
101—Water-Coolers, 7 models, are all stainless steel—for service in textile mills, refineries, food processing or chemical plants, etc. Both air-cooled and water-cooled condensing units are available, with capacities from 5 to 27 gph. *Temprite Products Corp.*

Turn to page 240

AND HOLDING ON BY A MAGNET! There's quite a drop at the feet of this scaffold worker . . . but he is in no danger. He is holding on by a permanent-powered reliable Eriez Magnet. This idea of herculean power and permanent dependability is the reason why you find so many Eriez Magnetic separators at work in industry today, preventing fires, machinery damage and product contamination. *All Eriez Magnets are non-electric, self-contained. They operate without any wires or attachments. Their magnetic power is guaranteed forever. The first cost is the last.* Eriez also produces a full line of HI-VI Vibratory Equipment, consisting of Vibratory Feeders and Unit Vibrators. Heart of this unique equipment is a permanently powered Alnico V magnetic element which eliminates rectifiers . . . produces a two-way push-pull action for more productive performance . . . provides broader operating ranges with less power consumption. HI-VI units are lightweight, compact, easily installed, never need realigning, have no friction-producing parts to wear, need no lubricants.

ERIEZ HI-POWR MAGNETIC SEPARATORS

ERIEZ HI-VI VIBRATORY EQUIPMENT



PULLEY CUTS CUSTOMER COMPLAINTS. At the Chicago Stock Yards Compost Co., "Fertilife" organic compost is produced. Bacterial processes speed up the composting period of the waste material (cow manure) and in four days the manure comes out as an odorless, weed-free compost. Previously, hinges, nails, even horseshoes managed to sneak into the bags of fertilizer. An Eriez Magnetic Pulley, recently installed at the end of the conveyor line that moves the dry material, now removes all traces of metal from the product. Customer complaints about tramp iron in the fertilizer have been completely eliminated.

Magnetic ideas from ERIEZ

THE GREAT GRATE MAGNET. It took a great design idea to provide magnetic protection for free-flowing material. With the Eriez Grate Magnet, baffle bars break the flow of material, direct the stream onto powerful magnetic tubes of stainless steel, so designed that the accumulation of tramp iron does not create choke-ups. The Eriez Grate Magnet prevents tramp iron damage to valuable equipment and prevents product contamination to free-flowing foods, chemicals, etc. Want more information on this product? . . . request Bulletin B-204.

SLURRY DRUMS SAVE STOCK SCREENS, PREVENT JAMMED JORDANS. More than 300 lbs. of tramp iron is removed each month by two Eriez HI-POWR Magnetic Slurry Drums installed in slurry lines at the Lawrence Paper Co., Kansas. Formerly, tramp iron damaged cylinder screens so badly they had to be replaced every three or four months. In addition, the metal jammed the four jordans in the line, causing a $4000 shell and filler replacement cost four times a year. Since the drums were installed, maintenance costs have dropped *more than 50%!* Designed for use in slurry lines in all industries, these self-cleaning drums are available in a wide range of widths and diameters.

Eriez' free booklet "Magnetic Ideas" can help you. Send for it without obligation, ERIEZ MANUFACTURING COMPANY, 70L Magnet Drive, Erie, Pa. OR on your specific request Eriez factory-trained field men backed by Eriez' laboratory and engineering know-how, will be happy to study your particular problem, make a plant survey and offer helpful "Magnetic Ideas".

THIS COOLING TOWER HOUSING IS fireproof,
corrosion-resistant and virtually maintenance free
Cooling tower in photograph above constructed by Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.

It's made of J-M Transite®

Corrugated asbestos-cement sheets

Johns-Manville Transite offers many outstanding advantages for constructing cooling tower housings. This time-tested material provides the ideal combination of properties needed for such rugged service.

It's Fireproof—Completely inorganic, Transite can't burn or support flame . . . greatly reduces the ever-threatening hazard of rooftop fires.

It Resists Corrosion—Transite is unaffected by weather, moisture and most corrosive elements found in industrial atmospheres.

It needs no Maintenance—Transite never needs painting or other protective coating under normal operating conditions . . . its high strength provides long life.

It's Attractive—A soft natural grey in color, Transite blends perfectly with modern architecture. In corrugated or flat form, Transite towers make an attractive addition to most buildings.

Write for further information—For further data and names of manufacturers who can supply cooling towers made of J-M Transite, write to Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ontario.

Johns-Manville TRANSITE THE MODERN MATERIAL FOR COOLING TOWERS

One TOOL DOES THE WORK OF Two!

CP Air-Saw CUTS and FILES...

Stainless Steel, Nickel, Copper, Aluminum, Iron, Steel, Brass, Plastics, Plexiglass, Fiberglas, Porcelain, Formica, Corrugated Transite Sheeting, Wood, Plywood, Hard Fibre, Wall Board, Masonite.

Use it as a saw or a file on heavy-duty production line work. Fit it with a blade and it becomes a utility saw capable of cutting practically every material and every possible shape . . . steel blade stock from your all-purpose band saw can be used for special applications. Add a file chuck and use it with round or flat shank files. Conversion takes 60 seconds. Designed with Variable Speed Control, its cutting action can be regulated to suit your work conditions. For details, write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Examples of its thousand-and-one uses

1. **In Receiving and Shipping** — opening wooden boxes and crates.
2. **In the Shop** — cutting thin gauge metal without warpage.
3. **In the Foundry** — deburring castings.
4. **In the Automotive field** — installing car heaters, radios and "extra" items.
5. **In the Electrical field** — armature undercutting, cutting coils out of electric motors, filing burrs from stator slots.
6. **In Plant Maintenance** — blind sawing in duct and piping work.

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

USP Warehouse Palletainers cut inventory costs. Contents are always visible for rapid inventory. Hinged front section permits easy access, even when units are stacked. *Anything* contained by a 2" mesh can be stored more quickly and safely in Palletainers.

Serving industry everywhere!

USP Warehouse type Palletainer features the half-drop end gate for easy access. 2,000 to 4,000 lb capacities.

Warehousing small parts in large quantities? USP Palletainers are the most practical, economical solution for achieving better space utilization plus efficient handling.

Specifically . . . USP Palletainers of the *warehouse type* offer you amazing versatilities for maintaining warehouse stocks conveniently — with contents always visible for fast, easy selection—plus savings in space—complete stacking safety, ease of transport and shipping. All these, plus the 75% storage space savings made possible by the *exclusive* "flat-fold" feature.

USP Palletainers have eliminated the guesswork from warehouse parts handling and storage operation. See for yourself how easily they will solve your problems.

UNION STEEL PRODUCTS CO., Albion, Michigan

USP PALLETAINERS

GENTLEMEN:
Please send me complete information on USP Palletainer application.

Name _____ **Title** _____

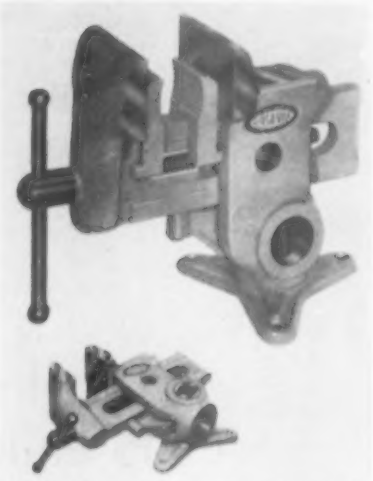
Company _____

Address _____

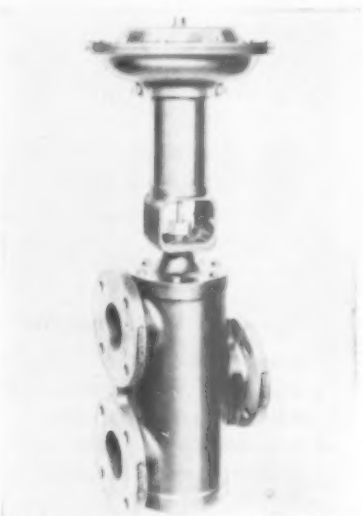
City _____ **Zone** _____ **State** _____

☐ **Please have one of your materials handling engineers contact me at once.**

For more about these products, circle item numbers on Reader Service card next to back cover.



102—Versa-Vise tool can be set in any working position in a full 360-deg. radius, standing or laid flat; and locked there simply by tightening the jaws. Has both smooth jaws and removable serrated jaws for holding all kinds of materials. Accessories. *The Will-Burt Co.*



103—By-Pass Valves, 3-way type, provides accurate control of liquid flow. Available, with molded rubber diaphragm operators, in 2½-, 3-, and 4-in. sizes. Simple maintenance—discs and seat rings can be changed without removing valve from pipe line. *Johnson Service Co.*

Turn the page

Boydell Aluminum Paint helps Continental Can Company keep this new plant clean

Aluminum-painted walls and steel structurals reflect light without glare, lend bright, cheerful atmosphere to the plant interior. Working conditions are more comfortable and pleasant.

Aluminum paint does good public relations job for Continental Can Company's new Fiber Drum Plant, Midland, Michigan. Aluminum Paint: **Boydell Bros. Co.**, Detroit.

Company policy specifies aluminum paint for all plants since 1936

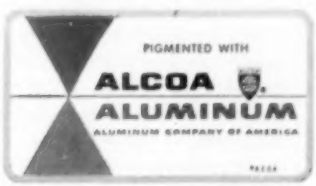
This new Continental Can Company plant produces fiber drums used for a wide variety of chemical, drug and food products. High standards of cleanliness must be maintained at all times. After 20 years' experience, this company finds aluminum paint is still best for keeping plant interiors clean . . . has made it a company policy to paint all plants with aluminum.

"Aluminum paint has a clean, pleasant appearance and looks sanitary," reports a company official. And because aluminum paint is more durable than other paints, it can stand up longer against frequent washing and vacuuming. In fact, Continental expects at least ten years of service from the aluminum paint on this new plant.

Alcoa® does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable information on all types of aluminum paint and aluminum asphalt coatings.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS



Aluminum Company of America, Paint Service Bureau
1791-L Alcoa Building, Pittsburgh 19, Pennsylvania.

Please send me your FREE booklets:

☐ Painting With Aluminum
☐ Aluminum Asphalt Roof Coatings Make Time Stand Still

I am interested in protecting _____

Company _____

Name _____

Address _____

City _____ Zone ____ State ____

RANSBURG
Electro-Spray
DOES IT
BETTER...
FOR LESS

Look what Ransburg Electrostatic Spray painting is doing in this eastern job shop, the Del-Val Finishers Division of J. W. Rex Company, Lansdale, Pa.

As a job shop, Del-Val handles a variety of work each month, painting hundreds of thousands of pieces and parts of various sizes and shapes.

The versatility and flexibility of Ransburg Electro-Spray makes it ideal for their varied painting requirements. Here's a typical example. Del-Val recently completed a contract for a Philadelphia manufacturer of barbecue trays with these results:

50% INCREASE IN PRODUCTION

50% SAVINGS IN LABOR and OVERHEAD

66% CUT IN PAINT COSTS, with improved, more uniform, and higher quality finish.

The job—flat sheet steel, 11" x 19"—enamel coated to withstand a 90 bend with sharp radius. Full coat one side; mist coat other.

WITH RANSBURG ELECTRO-SPRAY		BY FORMER HAND SPRAY	
Output, 375 panels per hour with 3 men		Output, 250 panels per hour with 4 men	
	per panel		per panel
Labor and overhead	.06	Labor and overhead	.12
Paint & lease cost	.017	Paint cost	.044
TOTAL COST	.077	TOTAL COST	.164

Want to know what Ransburg Electro-Spray can do for you in YOUR finishing department? Write for our new No. 2 Process brochure. It tells the WHAT & HOW of electrostatic spray painting, and with numerous production-line examples, shows how other manufacturers are cutting finishing costs . . . increasing production, and improving the quality of their work with Ransburg equipment. Too, we have available now a new movie, "The Big Attraction," a 27-minute sound and color film on electrostatic spray painting.

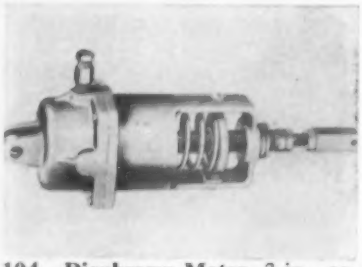
Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

FACTORY / EQUIPMENT NEWS

Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.



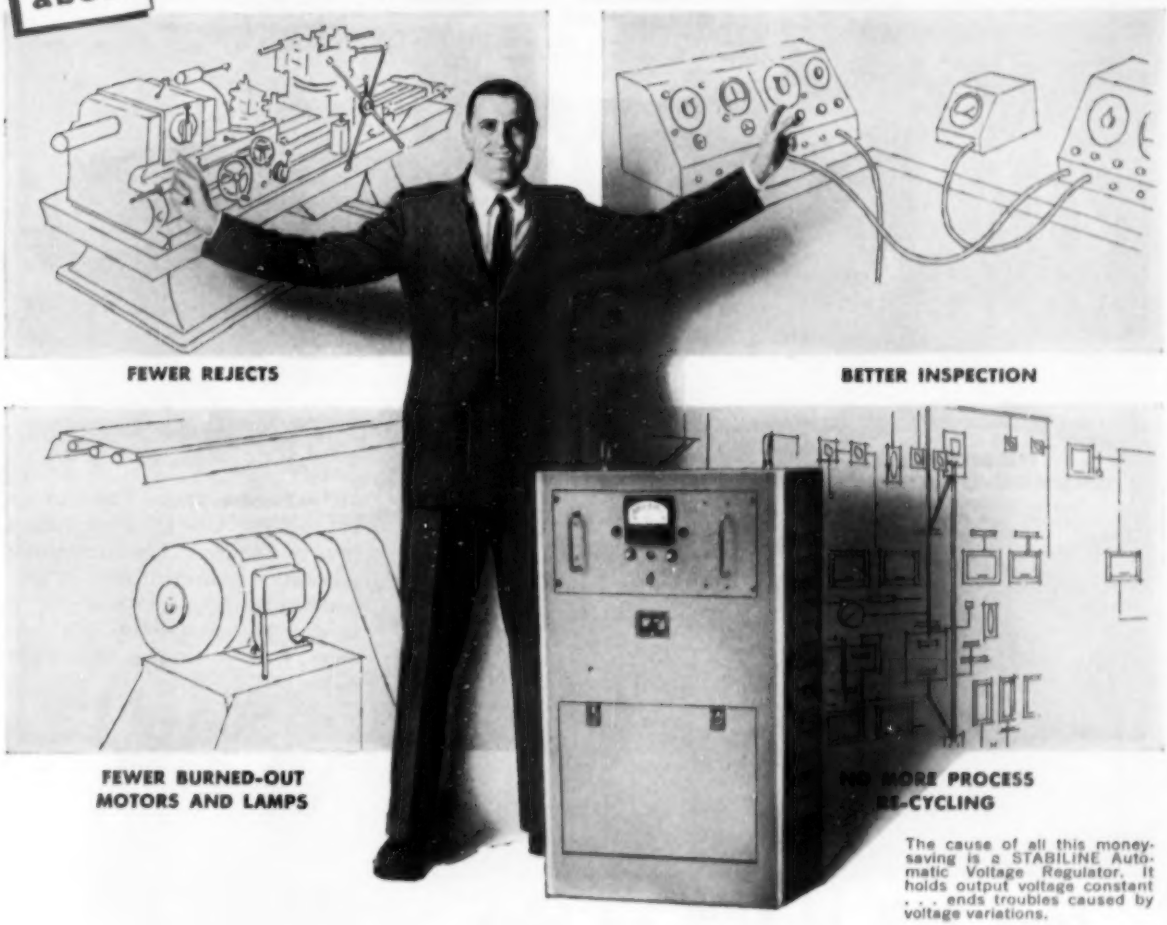
104—Diaphragm Motor, 3-in., operates on air, water, or oil pressure, provides thrusts to 80 lb. with maximum stroke of 2⅛ in. Made for gradual push-pull control of levers on industrial equipment; heating, ventilating, air-conditioning control. *The Powers Regulator Co.*

105—Inert Gas Arc Welder, rated 200 amp., 40 volts, has current range of 10 to 300 amp., a-c or d-c. Features easily removable side panels, recessed control panel, current-selector switch, magnetic contactor and removable rheostat for remote control. *Hobart Brothers Co.*

106—Teflon Hose, with detachable, re-usable fittings, suits applications where exposure to wide temperature ranges and injurious chemical action is encountered—such as steam and hot asphalt lines with fluid temperatures in the −100 to +500 F. zone. *Aeroquip Corp.*

Turn the page

Facts about **STABILINE*** *Automatic* **Voltage Regulators**



FEWER REJECTS

BETTER INSPECTION

FEWER BURNED-OUT MOTORS AND LAMPS

NO MORE PROCESS RE-CYCLING

The cause of all this money-saving is a STABILINE Automatic Voltage Regulator. It holds output voltage constant . . . ends troubles caused by voltage variations.

"Now, I'm Saving Money RIGHT and LEFT for My Company"

"I always figured that the electrical equipment and gear in my plant would work OK within the 'allowable' voltage variations. Now I learn that just isn't so. To work its best and its longest, voltage sensitive equipment should run *exactly* at its rated voltage. Sluggish solenoids and timers. Inspection gear out of calibration. Control equipment 'out of phase.' All these things happen when voltage varies. And then you're headed for trouble and expense. STABILINE Automatic Voltage Regulators are working in my plant now — saving me trouble . . . saving my company money. I suggest you look into this situation in *your* plant."

Be sure to see SUPERIOR ELECTRIC'S Mobile Display when it is in your area.

Branch Offices at: 14663 Titus St., Van Nuys, California • P. O. Box 946, 2881 El Camino Real, Redwood City, California • 482-8 Eglinton Ave., West, Toronto 12, Ontario, Canada • 2217 Biscayne Blvd., Miami 37, Florida • P. O. Box 48, 721 So. Blvd., Oak Park, Illinois • 4033 W. Rogers Ave., Office #2, Tippett Bldg., Baltimore 15, Maryland • 250 Park Ave., Rms. 502-504, Postum Bldg., New York 17, N.Y. • P. O. Box 132, 101 Public Sq., Medina, Ohio • 4515 Prentice St., Room 201, Dallas 6, Texas • 839 Central Bldg., 810 Third Ave., Seattle 4, Washington.

*Trade Mark Reg. U. S. Pat. Off.

THE SUPERIOR ELECTRIC COMPANY

1311 MIDDLE STREET, BRISTOL, CONNECTICUT

Please have your representative call ☐

Please send me STABILINE Bulletin S351 ☐

Name .....

Company .....

Address .....

City ..... *Zone* ..... *State* .....

POWER SWEEPING
Tennant "75" Sweeper has EXCLUSIVE time-saving features . . . often pays for itself in 1 to 6 months.
TENNANT
REMOVING GREASE-CAKED DIRT
Powerful SELF-PROPELLING "Model L" cleans 21' path, picks up soilage . . . does the work of a crew!
TENNANT

save 30% to 60% on both floor cleaning jobs

As a result of EXCLUSIVE features, TENNANT machines avoid usual time-wasting delays on floor-cleaning jobs . . . usually save you 30% to 60% in labor costs alone.

In sweeping, for example, a TENNANT "75" Sweeper picks up *all* types of litter on-the-run . . . reverses instantly . . . drives like a car. Does a very clean job even in dusty areas and usually outperforms a 3 to 12-man crew. Several types, sizes.

Ask for FREE inspection and savings estimate

In removing traffic-packed dirt, too, a TENNANT Industrial Floor Machine saves *extra* manhours. Cleans and picks up in one operation . . . leaves smooth, dry surface for traffic. Very efficient. Many types: 8" to 36" path. *WRITE for free inspection of your floors and estimate of probable cost-savings.*

G. H. TENNANT COMPANY, 2554 N. 2nd St., Minneapolis 11, Minn.

TENNANT • FLOOR MACHINES

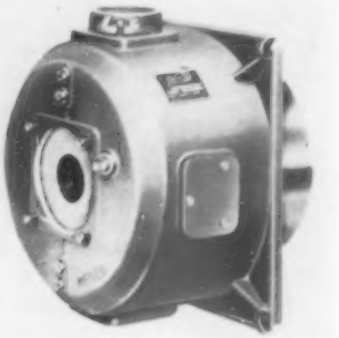
SPECIALIZED MAINTENANCE EQUIPMENT

POWER SWEEPERS • FLOOR MACHINES • SCARIFIERS • ROOF SCRAPERS • CONCRETE ROUTERS

FACTORY / EQUIPMENT NEWS

Begins on page 160

For more about these products, circle item numbers on Reader Service card next to back cover.

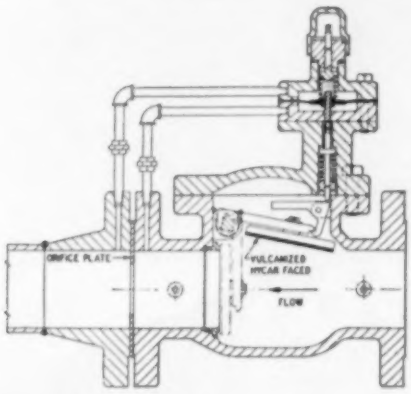


107—Blended Flame Unit, for gas or oil firing with extra air volume insures complete fuel combustion and better heat circulation at temperatures of 400 to 1800 deg. F. in industrial furnaces, ovens, kilns, and other heat processing equipment. *Hauck Mfg. Co.*

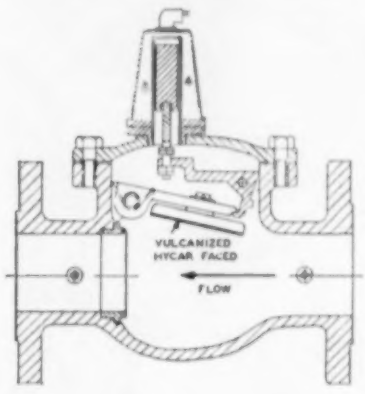
108—Foot-Spray Unit wards off athlete's foot in the shower room—dispenses a fresh, full-strength treatment each time someone steps on it. The solution, dispensed from a sealed tank, can't become contaminated, or diluted from shower drippings. *Sani-Mist, Inc.*

109—Combustion Assemblies, for modernizing or converting industrial heating equipment, use gas, oil or combination gas-oil firing. Include burner, automatic controls, forced-draft air supply, firing control, ignition, piping, wiring, refractory. *Orr & Sembower, Inc.*

Turn to page 248

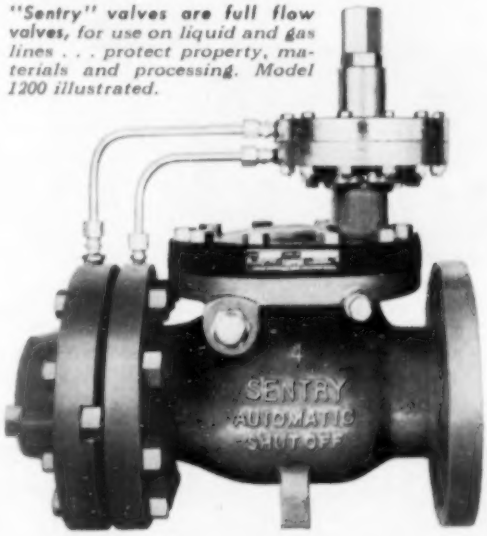


Model 1200. "Sentry" **excess flow valve** *automatically and instantaneously shuts off when the rate of flow in the line exceeds a predetermined rate.*

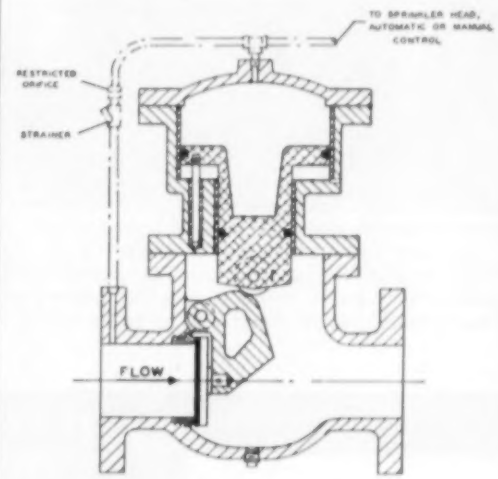


Models 1700 and 1800 "Sentry" **solenoid shut-off valves** *operate by remote electrical control automatically and instantaneously. In Model 1700, solenoid is energized, in Model 1800 solenoid is de-energized to maintain flow.*

"Sentry" valves are full flow valves, *for use on liquid and gas lines . . . protect property, materials and processing. Model 1200 illustrated.*



Other types "Sentry" Valves: high-pressure and low-pressure and over temperature shut-off valves available.



Model 3000 "Sentry" **piston operated quick-opening valve** *opens instantaneously when the pressure above piston is released. Ideal for deluge systems — and for remote opening and closing of fuel line.*

Now Coppus brings you "Sentry"® Valves for automatic protection

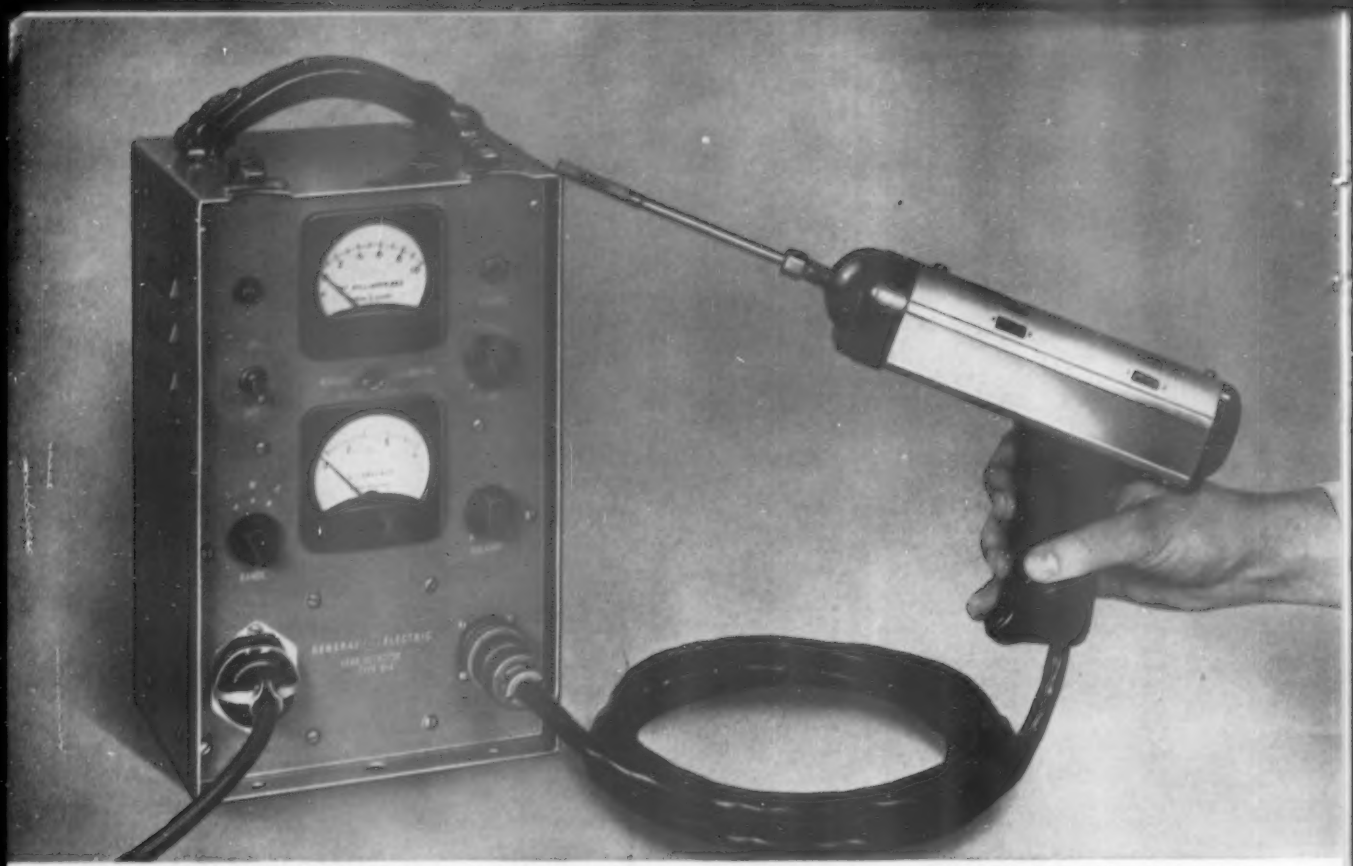
These valves are *patented* quick-closing latch type and quick-opening piston type. All are full flow valves.

Latch-type "Sentry" valves are widely used in the chemical, petroleum and gas industries for closing automatically and instantaneously gas, process and fuel lines. The piston type valve can be automatically or manually opened and closed from any remote location. It is ideal for deluge systems, operates instantly; closing of this valve is against the flow, eliminating water hammer.

Sizes run from 1½" to a full 8". For full information send for Coppus Bulletin 500 to Coppus Engineering Corporation, 111 Park Avenue, Worcester 2, Massachusetts.

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

LOOK FOR THE BLUE BAND THAT IDENTIFIES COPPUS QUALITY



1 **HIGHLY SENSITIVE,** the G-E Halogen leak detector, Type H-1 will find a leak of 1/100 ounce of "Freon"* a year. Use it to check for leaks in pressure systems such as refrigeration equipment as well as in closed systems into which a tracer gas and pressure can be placed such as tanks, tubing, fuel cells, boilers, pipes, pneumatically operated equipment, etc. Whenever leaks can be expensive in terms of money, danger or reputation, use the General Electric Type H-1 leak detector to find them. No other method or instrument approaches its sensitivity, fast response, versatility and convenience.

G-E LEAK DETECTORS SERVE INDUSTRY AS

FOR PRESSURE SYSTEMS

Type H-1
Halogen tracer gas
Indicates leak, does not measure leak
Price $604.80**

FOR VACUUM SYSTEMS

Type M-1
Helium tracer gas
Indicates and measures leak
Price $4100.00**

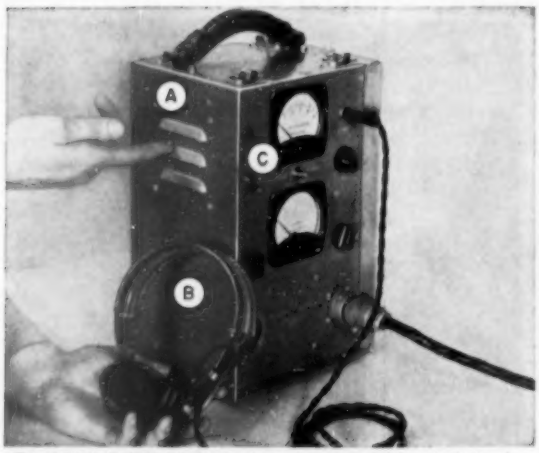
IN ASSEMBLY-LINE TESTING of Lincoln automobile air-conditioners, the General Electric Halogen Leak Detector, Type H-1, is used to quickly "sniff" all vital connections under the chassis and hood.

TO CUT REJECTS, the Angle Products Company, Cleveland, Ohio, checks their hydraulic oil and fuel tanks with the G-E leak detector. It has reduced the company's inspection time by 35%.

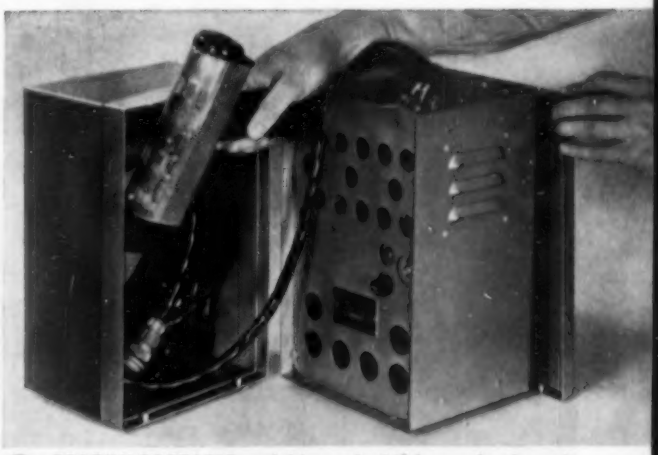
*Registered trade-mark, Kinetic Chemicals Div. of E. I. du Pont de Nemours & Co.
**Manufacturer's suggested retail price.

How Dependable G-E Leak Detectors Simplify Locating Hard-to-find Leaks

FIND LEAKS QUICKLY IN EITHER PRESSURE OR VACUUM SYSTEMS



2 **LEAK INDICATIONS** given by a variable-pitch loudspeaker (A), earphones (B), and instrument dial (C) assure a true leak signal. Unit pin-points leaks too small to be found by older methods. Earphones may be purchased from your radio-supply dealer.



3 **READILY PORTABLE,** weighing only 24½ pounds, the unit may be carried to where it is needed. It is well suited for assembly-line use as well as for service testing in the field wherever alternating current is available. Leads and probe may be stored easily in rear of control cabinet.

IMPORTANT TESTING AND INSPECTION TOOLS

FOR VACUUM SYSTEMS or pressure systems the Type M-1 Mass Spectrometer leak detector will locate leaks as small as 5×10^{-10} standard cubic centimeters of air per second.

Shown above (left) checking an evacuated refrigeration cooling unit, the detector detects leaks so small that in 1000 years only 1 cubic inch of air would pass through the opening.

SECTION H605-60
GENERAL ELECTRIC COMPANY
SCHENECTADY 5, N. Y.

Please send me the following bulletins:

- ....**Halogen Leak Detector, Type H-1 (GEC-233)**
- ....**Mass Spectrometer Leak Detector, Type M-1 (GEC-336)**
- ....**Measuring Equipment Catalog (GEC-1016)**

NAME .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

GENERAL ELECTRIC

Wholesalers use NEST-KARTS for Order Pickin'

Many wholesale distributors are taking advantage of the savings gained by using NEST-KARTS in their order departments. Individual orders are kept together — chances of items being misplaced are held to a minimum!

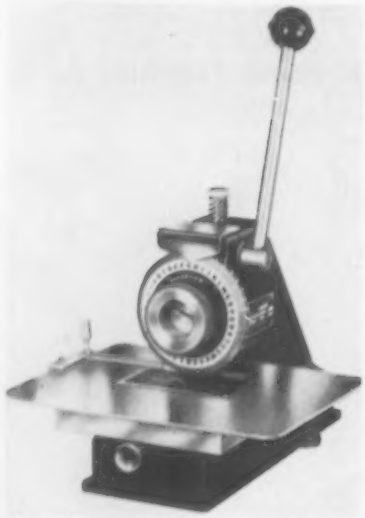
You'll find many ways in which NEST-KARTS will bring real savings to your plant operations, too. From the mail room to the supply department, NEST-KARTS, with their prelubricated and permanently sealed ballbearing axles and semi-pneumatic tires, will be your "handy man."

REGAL 101
NEST-KART

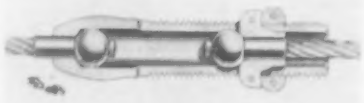
Whether you'll need one or many NEST-KARTS, send for further details now. You'll be pleased with the value-price of these sturdy carts . . . made possible by our volume production for supermarket use from coast to coast!

FOLDING CARRIER CORP.
OKLAHOMA CITY, OKLA.
Originators of NEST-KARTS
America's Highest Quality Shopping Carts

For more about these products, circle item numbers on Reader Service card next to back cover.



110—Nameplate Press is a handy, compact machine for stamping individual letters and numbers on all types of identification plates and tags—which are then permanently attached to furniture, machinery, etc. A big help in improving property control systems. *Clearview Co.*

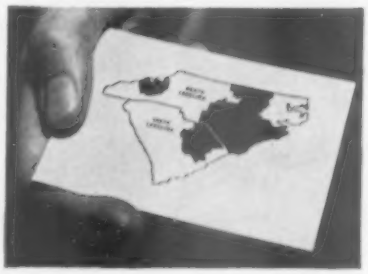


111—Cabuckle is shorter, lighter than ordinary turnbuckle of similar capacity; made of anodized aluminum and molybdenum steel to outlast high-fatigue cables. Simple to install and operate, with no cable twist. Available for cable up through 7/32 in. *Pheoll Mfg. Co.*

112—Electronic Scales are two types: full electronic (load cells replace conventional lever systems), and levetronic (for converting full mechanical scales to electronic weighing and instrumentation). Weight recording instruments may be located up to 250 ft. from scale platform. *Fairbanks, Morse & Co.*

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants



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We accept the challenge to prove that somewhere in our service area is the right location for your operation.

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Carolina Power & Light Co.
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MAINTENANCE MEN

Have a problem with stoppage in your waste lines? Please write us for help. We can help you. Write: Dept. A

STANDARD APPLIANCE CO.
2110 Troy St., Dayton 4, Ohio

A GOOD HABIT

is any habit which will be of benefit to you. By watching this Where-to-Buy section for a ready reference to cost-cutting, production-boosting products, you'll be building good habits.

New B&D HEAVY DUTY Impact Wrench hits maximum torque in 6 seconds!

So rugged we dare offer a year's FREE SERVICE certificate!

In a grueling torture test, the *Power-Built* Black & Decker Heavy-Duty Impact Wrench ran for 500 hours of continuous operation without a breakdown—and was still going strong. Our special *free* service certificate is extra proof of its ruggedness. Yet this tool is so speedy, it hits maximum torque when other impact wrenches are just warming up.

Ask your B&D distributor today for a free demonstration, or write: THE BLACK & DECKER MFG. CO., Dept. 1311, Towson 4, Md.

No other manufacturer DARES MAKE THIS SPECIAL OFFER!

Every B&D Impact Wrench is covered for *one full year* by a *free* service certificate. It protects you against *all* maintenance costs resulting from normal use!

★ **It costs less to maintain... lasts longer...runs cooler!**

Packed with Advanced Features!

1. **Positive-Action Reversing Ring** protected from accidental operation by stationary end cap.
2. **Absorbs Shock**—patented armature construction.
3. **Reduced Operator Fatigue**—pistol grip handle and perfect balance provide maximum comfort.
4. **Lower Maintenance Costs**—all mechanical parts are ruggedly constructed for longer service life.
5. **Plus Twice The Airflow of Comparable Tools. Can't Stall or Overload. Uniform Output. Rated above 120 Ft. Lbs. Torque.**

Look in the Yellow Pages under "Tools — Electric" for Nearest Distributor.

B&D Black & Decker®

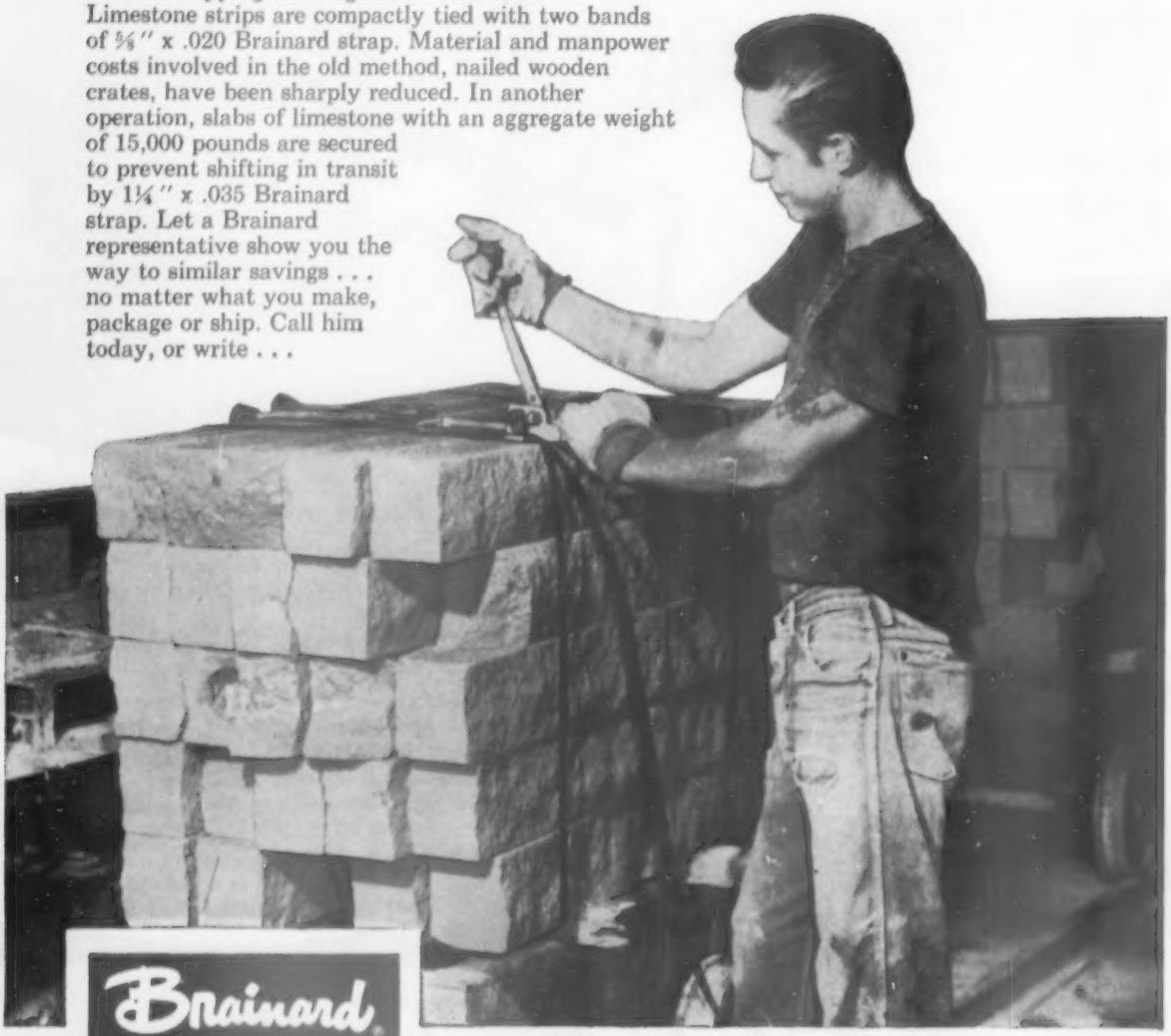
Portable electric tools . . . power-built to last!

How

BRAINARD STRAPPING SERVICE

slashed building stone handling costs 50%

With the help of Lew Dickson, a Brainard strapping expert, Empire Stone Co., Bloomington, Indiana, reduced limestone handling costs by more than 50% . . . cut shipping breakage to a minimum. Limestone strips are compactly tied with two bands of ⅝" x .020 Brainard strap. Material and manpower costs involved in the old method, nailed wooden crates, have been sharply reduced. In another operation, slabs of limestone with an aggregate weight of 15,000 pounds are secured to prevent shifting in transit by 1¼" x .035 Brainard strap. Let a Brainard representative show you the way to similar savings . . . no matter what you make, package or ship. Call him today, or write . . .



Brainard

SHARONSTEEL

STEEL DIVISION
SHARON STEEL CORPORATION

THE BRAINARD STEEL DIVISION
of the Sharon Steel Corporation
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MAKERS OF QUALITY STEEL STRAPPING

ONE does the work of six!

...in ½ the time!...with savings up to 25%

with the MERCURY FORK TRUCK— "TRACKLESS TRAIN" SYSTEM

Mercury Fork Truck loading Mercury A-310 Trailers

Mercury Fork Truck stacking pallet loads at destination.

Mercury Tug Electric Tractor pulling loaded Mercury A-310 Trailers.

When moving material over 150 feet take the short cut to lower handling costs . . . the Mercury Fork Truck—"Trackless Train" System. One Mercury tractor provides the power that moves trailer loads over long distances. Mercury fork trucks load, unload and stack at receiving and destination points. The result—no wasted motive power—each unit performs its job at top efficiency.

For flexibility, the Mercury Fork Truck—"Trackless Train" offers many advantages. Trailers can be routed anywhere, stored temporarily with loads intact or moved by hand over short distances. Tractors are quickly detached from the "burden carrier"—need not make return trip empty. Tonnage can be varied by adding or subtracting trailers. Hundreds of plants, large and small, now use the Mercury Fork Truck—"Trackless Train" System. Investigate its possibilities for your handling facilities. Mail coupon below, today.

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Manufacturers of a Complete Line of Fork Trucks, Platform Lift Trucks, Industrial Tractors and Trailers.

Attach to your letterhead for complete details

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Send me full information on the Mercury Fork Truck—"Trackless Train" System of Material Handling.

Name_____

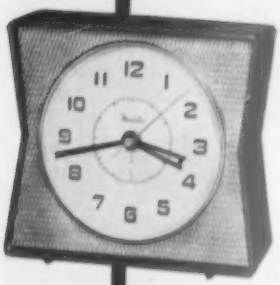
Firm_____

Address_____

City & State_____

General Time Corporation

IS PROVING THAT IT'S GOOD BUSINESS TO PRODUCE IN GEORGIA



For Additional Facts and Latest Figures Write Today To Scott Candler, Secretary Dept. T

GENERAL TIME CORPORATION
100 LAFAYETTE STREET, NEW YORK 13, N Y

OFFICE OF THE PRESIDENT

May 1, 1956.

Mr. Scott Candler, Secretary
Georgia Department of Commerce,
Atlanta, Georgia.

Dear Mr. Candler:

When General Time Corporation decided some three years ago to establish a new plant, we studied possible locations in every part of the country. Athens, Georgia, was our first choice, and we have never regretted it.

The manufacture of Westclox and Seth Thomas electric timepieces depends upon skilled workers. We have found in Georgia an abundance of the high-caliber people we require. Their eagerness to learn new skills has made it a pleasure to train them. Athens also has other important assets, not the least of which are ample power and good water.

Our relations with fellow members of the community have been most gratifying. General Time employees who moved to Athens have found it one of those rare cities that combine a heritage of dignity and beauty with the progressive, modern American spirit that animates the new South.

Thanks to such advantages as these - and to our steadily increasing sales in the Southeast and elsewhere - we plan not only to stay, but also to expand our operations, in Georgia.

Sincerely yours,

President

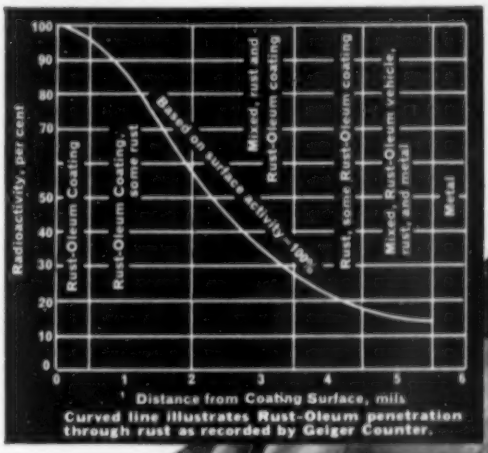
GEORGIA DEPARTMENT OF COMMERCE
100 STATE CAPITOL · ATLANTA, GEORGIA

RUST-OLEUM®

PENETRATION

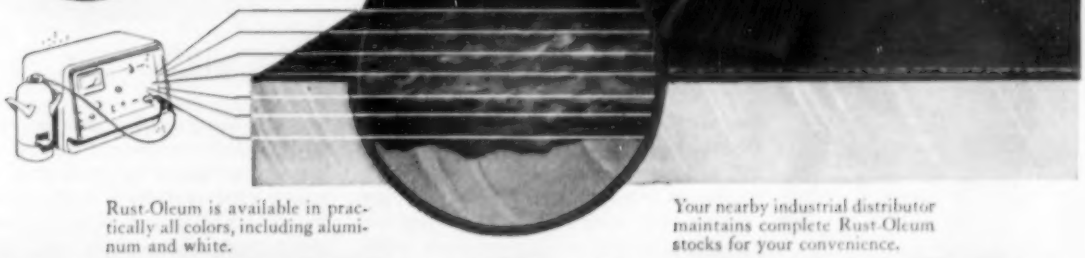
through rust to bare metal traced by Geiger Counter. To effectively stop rust—the vehicle of a protective coating, when applied over a sound, rusted surface—must penetrate through the rust down to bare metal. **Rust-Oleum does exactly that!—as proved by radioactive research!** Rust-Oleum's specially-processed fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Penetration *through rust* to bare metal by Rust-Oleum's specially-processed fish oil vehicle was then traced by Geiger Counter.

You stop rust, because Rust-Oleum's fish oil vehicle soaks deep down to bare metal and into the tiny pits where it drives out air and moisture that cause rust. You save, because this same *penetration* enables you to apply Rust-Oleum directly over rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your letterhead for your thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



Curved line illustrates Rust-Oleum penetration through rust as recorded by Geiger Counter.

There is only one Rust-Oleum. It is distinctive as your own fingerprint. Accept no substitute. Buy—and specify only Rust-Oleum. You'll be happy that you did.



Rust-Oleum is available in practically all colors, including aluminum and white.

Your nearby industrial distributor maintains complete Rust-Oleum stocks for your convenience.

RUST-OLEUM®

STOPS RUST!

See our Catalog in Sweets, or write for complete information.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY

Rust-Oleum Corporation
2453 Oakton Street
Evanston, Illinois

- ☐ Complete literature including color charts.
- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

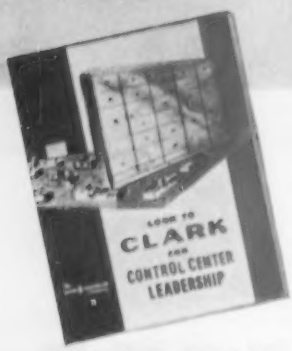
NEW CLARK CONTROL CENTERS CAN SAVE YOU ONE VERTICAL SECTION FOR EVERY FIVE!

features:

- SPACE SAVING
- SIMPLER MAINTENANCE
- GREATER VERSATILITY
- MAXIMUM SAFETY
- STRONGER and MORE RIGID

plus!

- CLARK TYPE "CY" STARTERS, OF TIME PROVEN SUPERIORITY



WRITE for your copy of this informative book containing complete information for adapting the new CLARK space-saving CONTROL CENTERS to your needs.

and each section is only 20 inches wide!

You *save space* two ways with new CLARK Control Centers—vertical sections are only 20" wide, and each vertical section can house up to 6 size 1 or 2 non-reversing combination starters. Thus 30 starters can be accommodated in 5 sections—total width only 100 inches—compared with 6 sections of ordinary 5-unit design and considerably greater width. *Maintenance* is easier because all wiring and service—even bus replacement—is from the front or top. Parts are standardized for greatest *versatility* and *flexibility*—making it simpler to adapt units to particular needs or alter arrangements after installation. For *maximum safety*, all bus is completely enclosed and empty compartments are protected by insulating barriers and closure panels. Heavy gauge steel plus exclusive design providing support for all load bearing members without dependence on shear strength of screws, assures added *strength* and *rigidity*.

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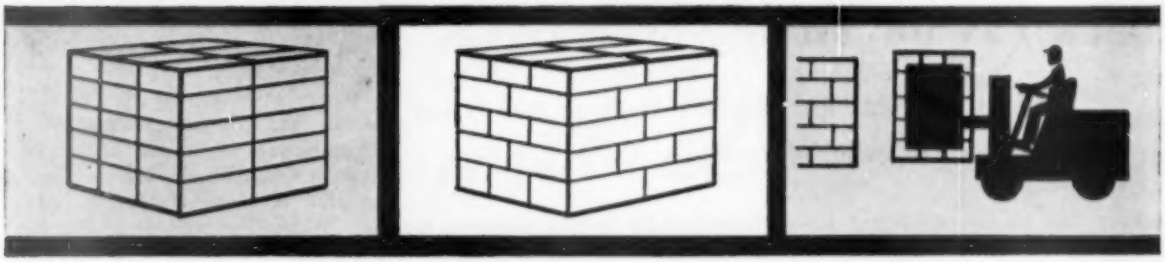
NO PALLETS NEEDED

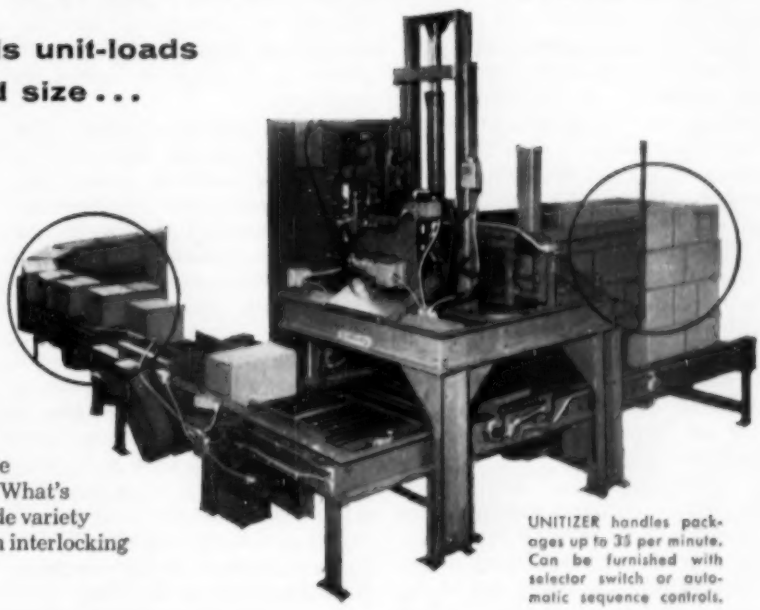
to build and handle loads like these



NEW *Standard* UNITIZER

assembles and builds unit-loads in desired shape and size . . . automatically . . . directly from conveyor line!

Here's a new machine offering all the advantages of conventional palletizers and pallet-load handling without the use of pallets. Unit-loads can be carried directly on the conveyor or picked up by clamp-type trucks. You save the cost of pallets . . . make more efficient use of available manpower. What's more, the UNITIZER handles a wide variety of package sizes . . . arranges them in interlocking or noninterlocking patterns.



UNITIZER handles packages up to 35 per minute. Can be furnished with selector switch or automatic sequence controls.

PLUS advantages:

These operating and construction features make the UNITIZER outstanding for uninterrupted service and low maintenance:

- Control and actuation circuits are comprised of thoroughly proven hydraulic and electrical systems. Control panel switches allow any function of UNITIZER to be individually tested.
- Operating economy is assured with only 7½ HP required.
- Compactness of UNITIZER saves floor space, simplifies installation on existing conveyor lines. No pits or building alterations necessary.
- Basic design makes all parts easily accessible.

Ask Standard

how the UNITIZER can help you expedite production while cutting handling costs. Contact the Standard representative listed in your Classified phone book or write STANDARD CONVEYOR COMPANY, North St. Paul 9, Minn. Sales and Service in Principal Cities. Ask for Bulletin A-10. Dept. G-11

50 years of conveyor experience

Standard

GRAVITY & POWER CONVEYORS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc., Member, New York Bar

Back Pay for Fired Workers

NLRB tightens qualification for workers. Then increases union's financial obligation.

Under the NLRA (National Labor Relations Act—or Wagner Act) unlawfully fired workers are entitled to pay for the period in which they were out of work. But the courts have held that they must minimize the amounts due. That is, they can't "willfully" fail to earn money and thus run up a big bill for the company. To determine whether an employee is minimizing the amount due, the NLRB set up this rule: Registration with a U.S. Employment Service office is *conclusive* evidence that the employee has done all he can.

The Board now changes this rule to say that such registration is just *one* factor to be considered. The circumstances will determine how much weight it is to be given.

Board members Murdock and Peterson dissented. They liked the old rule because it was simple and easy to administer.

The Board reversed another back pay ruling of long standing. When an employee is fired at the request of a union, and the Board orders reinstatement, the union may be required to make up the back pay lost by the worker. In making this payment unions have been allowed to deduct those amounts customarily deducted by employers from pay—such as social security and other benefits.

The Internal Revenue Service ruled that back pay paid by unions under these circumstances *is not wages*. The Board, to conform to this theory, now orders the union to pay the full amount without deduction. The union, however, does not have to pay the employer's payroll tax or the employee's deductions for benefits, etc.

However, the story is not unchanged as far as back payments to be made by the employer.

If an employer unlawfully discriminates against his employee, the penalty of the old Wagner Act descends upon him. Under the Taft-Hartley Act, which amended the Wagner Act, penalty will also descend upon unions that force an employer to discriminate against his employees.

What are these penalties? The Board can order the union to stop making the employer discriminate against the employee. The employer can be compelled to reinstate the employee discriminated against. The union may be made to reimburse the employee discriminated against for lost wages.

Two recent cases on the subject of what lost wages shall be paid to discriminantly discharged employees upset NLRB rulings of long-standing. The first case dealt with back-pay being footed by the company for acts of discrimination; the second case dealt with the bill being footed by the union because they compelled an employer to discriminate.

Walkout Due to Work Conditions

Section 502 of the Taft-Hartley Act is not used much—but when it is invoked it can nullify the no-strike clause of your union contract. Section 502 says that "quitting of labor by an employee or employees in good faith because of abnormally dangerous conditions for work at the place of employment" is not a strike. Because it is not a strike, the National Labor Relations Board says it is a protected activity. That is, striking employees can't be fired for violating a contract no-strike clause. The "cooling-off" provisions of the Act do not apply.

What is abnormally dangerous? In the case involving Section 502, the employees working in the buffing room of Knight Morley Corporation, an auto accessories plant, walked out. Why? The blowing system in the plant konked out. The temperature in the buffing room hit 110 degrees. Dust, lint, dirt, abrasives flew all over the room. These are abnormally dangerous conditions, ruled the Board. The company had no right to fire the employees who walked out.

A ruling of this sort can be a field day for unions with borderline scruples. One of the Board members recognized this by pointing out that the Board did not open the door to "quickie work stoppages and walkouts at any time the employees so desire by . . . claiming that the conditions of work are unsuitable." The test is the objective fact—not the employees' state of mind.

"Continuing" Grievances

In many union contracts, grievances must be filed within a specified time or they are barred. When the bar descends upon them, unions argue that the particular grievance was a "continuing" one. And this sometimes works—as when arbitrators ruled that the following were "continuing" grievances and not barred:

. . . Use of part-time employees (went on for 3½ years).

. . . Incorrect seniority (mistake made 9 years ago).

. . . Incentive system which violated a contract (18 months went by before a grievance was filed).

But *layoff* is not a "continuing" grievance, recently ruled an arbitrator. A shipyard machinist was laid off. An employee with less

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seniority, but in the same classification, was retained. The union took up the question with management informally. Didn't file a written grievance until 31 days after the layoff.

But the contract provided that no grievance would be considered unless filed within 30 days "after the date on which the facts or events on which such alleged grievance is based shall have last existed or occurred."

The arbitrator considered the grievance as having occurred on the day of the layoff. He also ignored the union's contention that the grievance had been discussed informally before filing.

Who said what to whom when the laid-off worker learned that he lost out by one day?

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Discount for Prompt Dues

Members Murdock and Peterson of the National Labor Relations Board are "letter-of-the-law" men—or view the cases before them with their dark glasses on.

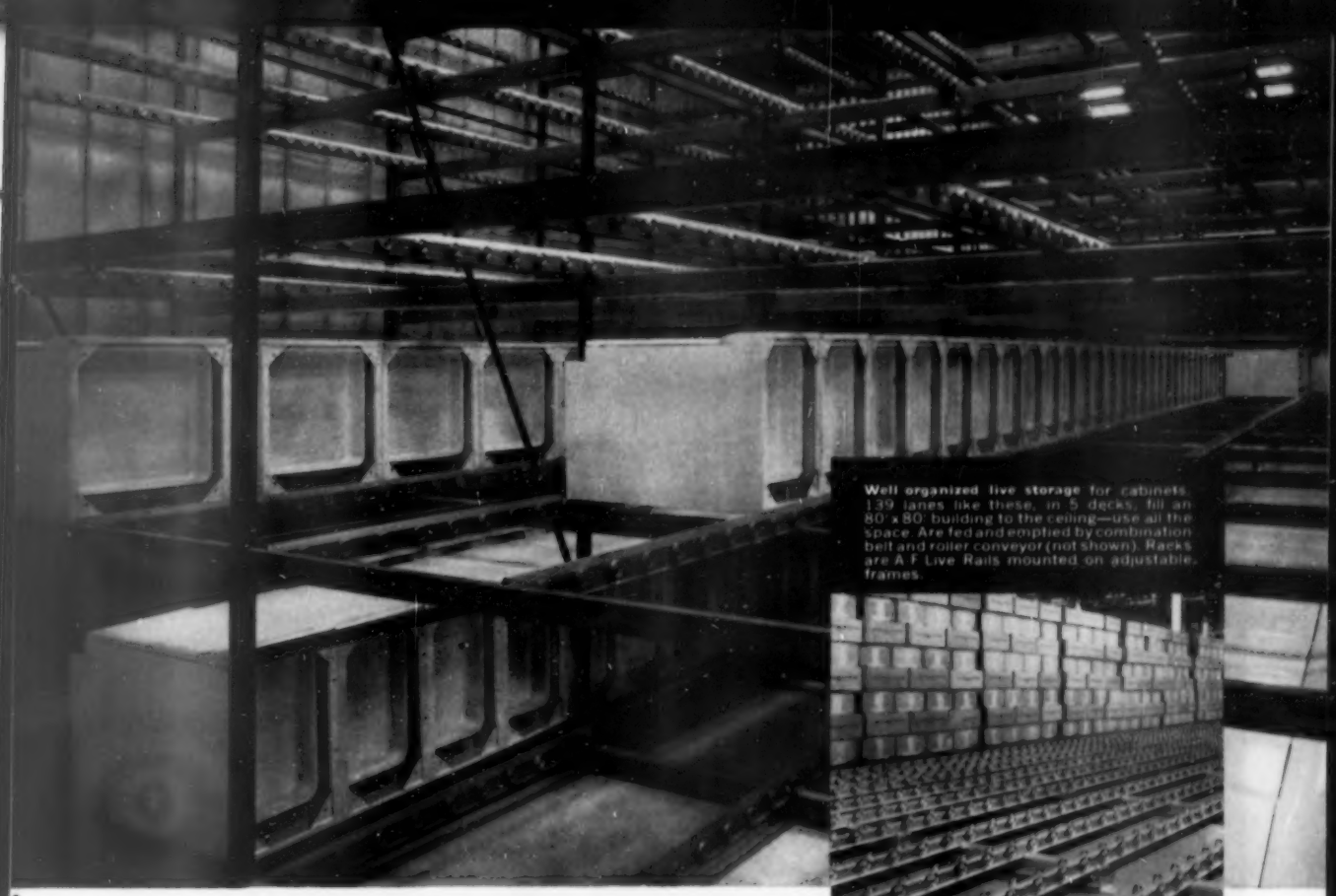
In a case involving the A & P, the Board had thumbed down the union practice of fining late dues payers one dollar. Under Taft-Hartley, a union may not require a member to pay fines or assessments as a condition of holding his job. However, in a case involving the National Biscuit Company, a bit of reverse twist resulted in this union's raising dues one dollar—and then giving prompt payers a one-dollar discount. The subterfuge was okay with Board Members Murdock and Peterson, but the majority ruled that the effect is the same, and once more turned its thumbs down.

Murdock and Peterson conceded that the effect of the two devices may be the same, but argued that the discount idea wasn't a fine or an assessment.

Double Up on Pensions

Old-line pension planners will tell you that one of the key purposes of a pension plan is to reward long-service employees—to reduce turnover by giving employees the prospect of a decent pension. Union pension makers' complaint with old-line employer pension plans is that it restricts labor mobility—ties the worker down to one job and deafens his ears to union pie-in-the-sky arguments. That's one reason why the Teamsters have been campaigning for a union-wide West Coast pension plan embracing some 300,000 employees. Each employer in the pool is supposed to put in 10¢ an hour per employee into a central fund. Workers can transfer from one pool employer to another without sacrificing pension benefits.

Libby, McNeill and Libby just signed up as a pool member, but added a new wrinkle which reconciles the opposing management-



Well organized live storage for cabinets. 139 lanes like these, in 5 decks, fill an 80' x 80' building to the ceiling—use all the space. Are fed and emptied by combination belt and roller conveyor (not shown). Racks are A-F Live Rails mounted on adjustable frames.

On still a bigger scale, this huge warehouse uses Live Rails to create a "rolling floor." Here packages are palletized, rows are fed and emptied by fork lift truck. Racks or "rolling floors" can be designed to accommodate almost any weight load.

A-F LIVE STORAGE RACKS

How big? Your packages, your space set the size!

"Filing cabinet" size — or as big as an entire warehouse — your A-F Live Storage Rack is designed specifically to suit your needs. Because there are no "standard size" live storage problems, there are no "standard size" A-F racks. (Components, of course, are standardized for economy). You get quick-reference live storage planned from the start to give you every advantage. Here's an example:

Toledo Desk and Fixture Co., Toledo, Ohio, makes many sizes and types of steel kitchen cabinets, paints them to order for their customers. Keeping cabinets well-organized and handy between flat coat and finish might have posed a big problem. But F. M. Crook, President of Toledo Desk, foresaw this. Working with A-F engineers, they developed together the special rack shown here. It consists of 139 separate gravity flow lanes. Each deck (between rack columns) is easily adjusted for height, lanes are adjusted for width. The result is a rack that will change shape to accommodate cabinets as small as 12" x 30" x 25" up to units 84" high. Each type and size of cabinet has its own private lane (or lanes) and every one is immediately available. Also, they are well protected from accidental damage.

A-F Live Storage Racks are built of versatile A-F Live Rails. By design, they can easily be arranged to suit your storage needs perfectly — now and in the future, and they're built in every detail to last. Call on A-F for the best answer to your live storage problem. Write today for complete details.

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GRATON & KNIGHT Company
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labor views. LML kicks in to the pooled plan, but in addition will maintain its own pension plan to furnish additional benefits to long-service employees.

What's Permissible Without Union OK?

Ask any employer what makes a lawyer good. He'll say: A good lawyer will tell you what you *can* do—not what you can't do. It's about the same way in labor law. In that vein the *Vanderbilt Law Review* carries an article on what an employer can do on his own, that is, without getting union approval. Three periods are covered in the article: (a) from the time of request for recognition to contract signing, (b) a strike or impasse period, (c) the entire life of the contract. To find his answers the author reviews court and National Labor Relations Board decisions.

The article is in the April 1956 issue. Write Vanderbilt University, Nashville, Tenn.

No Union Meetings in Lunch Hour

Lunch hours belong to employees. They can do things other than eat, as for example, buttonhole workers for union membership. But, said the National Labor Relations Board's general counsel, they go too far when they hold a formal union meeting during lunch hour—even though the lunch hour is theirs, and union solicitation has been okayed by the Board. He found that a company was within its rights when it disciplined workers who participated in a lunch-hour meeting.

The union and company had reached an impasse on the terms of a new contract. The union scheduled the lunch-hour meeting to get the workers to kick in to a strike fund. Don't do this, warned the company — such meetings are against company policy.

In upholding the company's right

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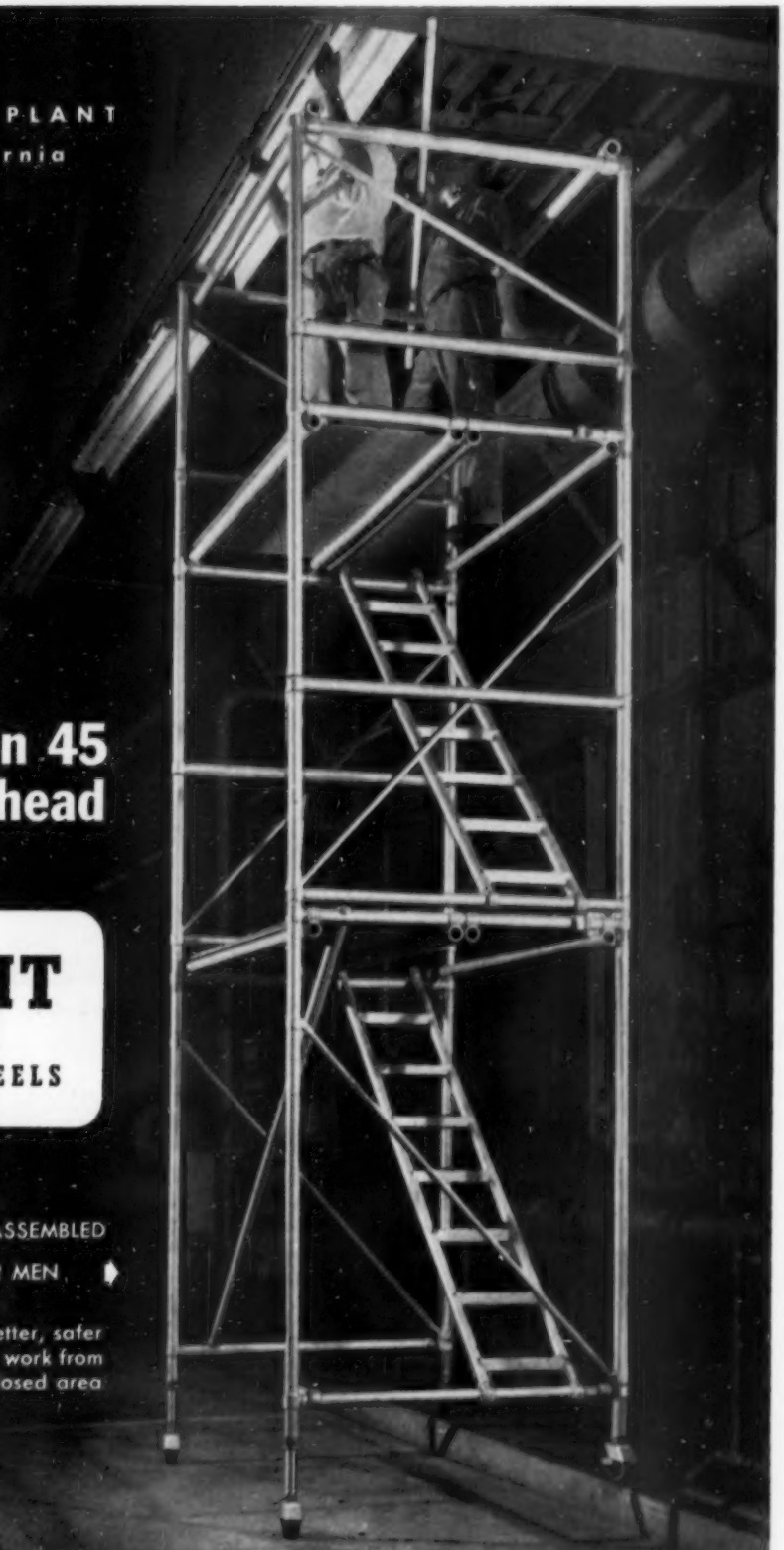
San Jose, California



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No need to tie yourself down with an "all-or-nothing" central dust collector system. You can buy as many Torit Dust Collectors as you need now and add more later as your plant expands. You can install Torit units yourself and shift them around as your needs change. You can hang them from a wall or ceiling as well as set them next to the machines they protect. We'll be happy to check your installation—or do the whole job.

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Torit Dust Collectors keep damaging dust away from bearings, bedways, slides, saddles and other "sensitive" machine parts. Users report that Torit units reduce machine wear as much as 80%. Torit units can be wired through the starters of the machines for automatic start-stop—and for power savings. Filtered air may be returned to the room to save heat. For more information on how Torit Dust Collectors save money, write today to

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311 Walnut Street, St. Paul 2, Minnesota, Dept. 305

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to discipline, the general counsel noted that the union would have had no difficulty in meeting elsewhere. And further, the company's rule was not discriminately applied.

Who Pays for Coffee Breaks?

Looking this gift horse squarely in the mouth, a U.S. Court of Appeals at Denver finds that this tie manufacturer didn't give 15-minute coffee breaks solely because they were of benefit to his employees. They were also to his advantage—and therefore under the Wage-Hour law he must pay for the breaks.

The workers were piece workers. The work was tiring. The workers requested and were granted two 15-minute coffee breaks on an optional basis. But when efficiency went up, the employer made the breaks mandatory. The workers agreed to waive pay for the periods.

The Court found that the breaks were of great advantage to the company. The time couldn't be used by the workers in their own way off the job. The waiver was illegal. Employees cannot waive wage rights granted by law.

The determinant factor in cases of this kind seems to be whether or not the work done or time spent was of "predominant benefit" to the employer or to the employee.

Right to Sub-Contract Work

The right of an employer to subcontract work came up again in a recent arbitration case. This time it involved Hearst Consolidated Publications. The newspaper decided to farm out its messenger service. Hired an independent messenger service to provide messengers. Fired 14 of its own messengers.

Squealed the union: This violates the union contract. The contract recognizes the union as the bargaining agent for the messengers. The contract also provides for discharge for

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Cities Service Chillo Cutting Oil produces astounding results for C.S.S. Machine & Tool Company, Philadelphia, Pa.

Metal stamping . . . precision grinding . . . machining . . . stud welding . . . tool and die making. These are some of the expert operations performed by the 120 skilled employees of C.S.S. Machine & Tool Company of Philadelphia . . . operations based on many years' knowhow and teamwork. And for the past year, with Cities Service cutting fluids, this work has been done with even greater precision, greater efficiency than ever before.

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If you have a lubrication problem, or even if you're running smoothly, talk with a Cities Service Lubrication Engineer. He's known for solving problems, known for making smooth operations still smoother. Or, if you prefer, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

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FACTORY / LABOR RELATIONS NEWS
Begins on page 256

good cause only. These two clauses were violated.

Ruled the arbitrator: The recognition clause merely sets up the status of the union. Doesn't create any other rights. But the discharge of the employees was not for good cause. Hearst had the right to subcontract. But here the messenger work was handled the same way after the arrangement as before.

The arbitrator distinguished this case from the case where work, once done on the company's premises, is contracted out to be done on the premises of another without control or direction of the company.

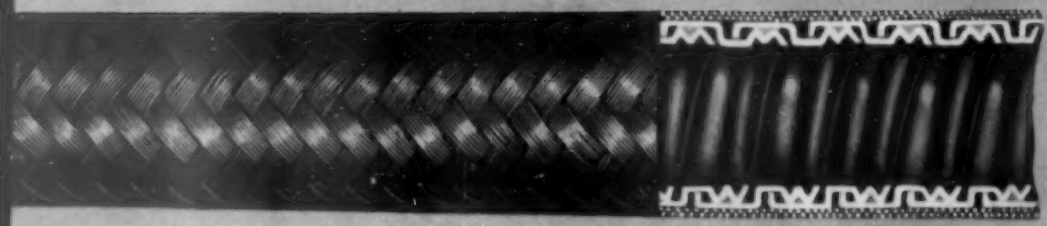
* * *

How union members feel. Most union members are favorable to unionism in general, but a good many are unhappy with the policies and practices of their local. Still more are distrustful of the national union. These are some of the findings reported in *Understanding The Union Member*, a University of Minnesota Press publication.

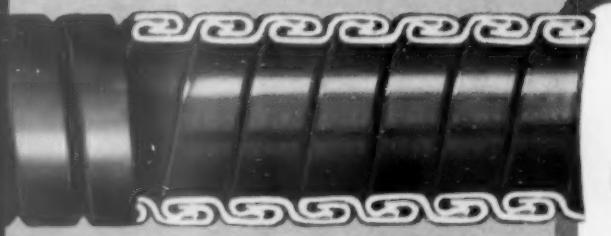
Low wage expose. Your poor-pay policy can become anyone's business under a New York State Supreme Court decision. A union picket line was okayed even though signs were carried proclaiming that this employer paid lower wages and contributed less to pensions than customary. The signs are all right if they tell the truth.

Restricting election propoganda. The NLRB set aside a representation election because the union handed out false literature the day before. The union stated incorrectly the gains made by it in other contracts. It was impossible for the company to check the facts, correct them.

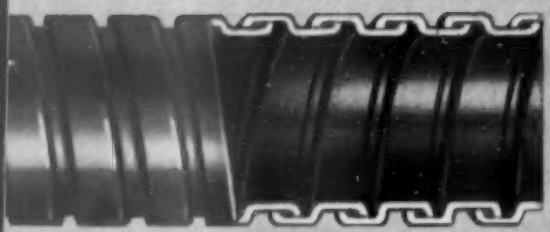
OK for late payers. The NLRB gave union members the right to tender back dues any time prior to discharge, even though they may have been several months delinquent. Under Taft-Hartley this protects union members from summary discharge for failure to pay their dues. The Board now extends the same right to initiation fees.



TYPE FP WIRE BRAIDED



HEAVY DUTY INTERLOCKED



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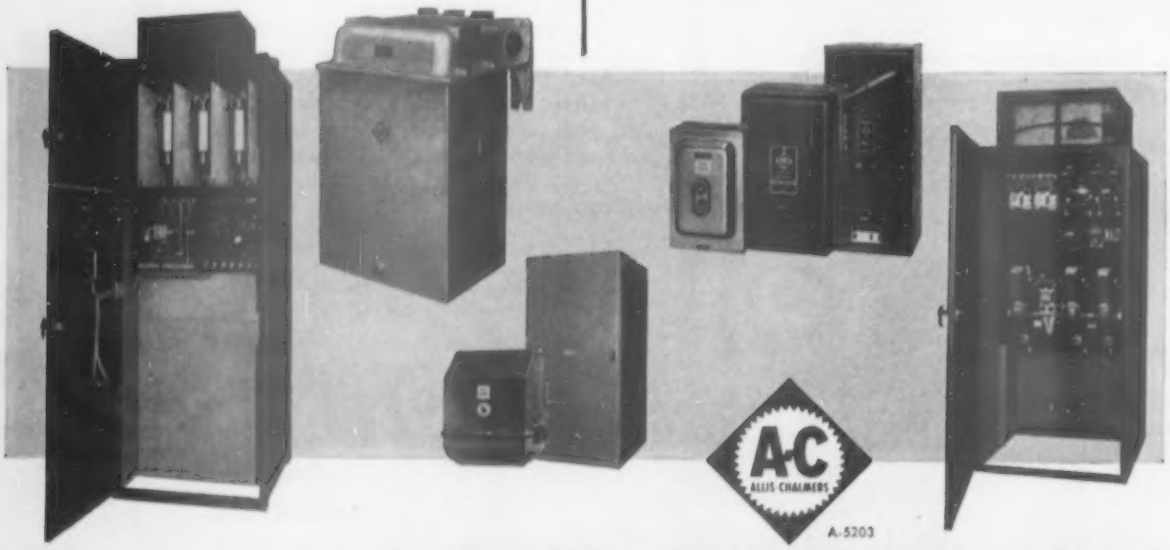

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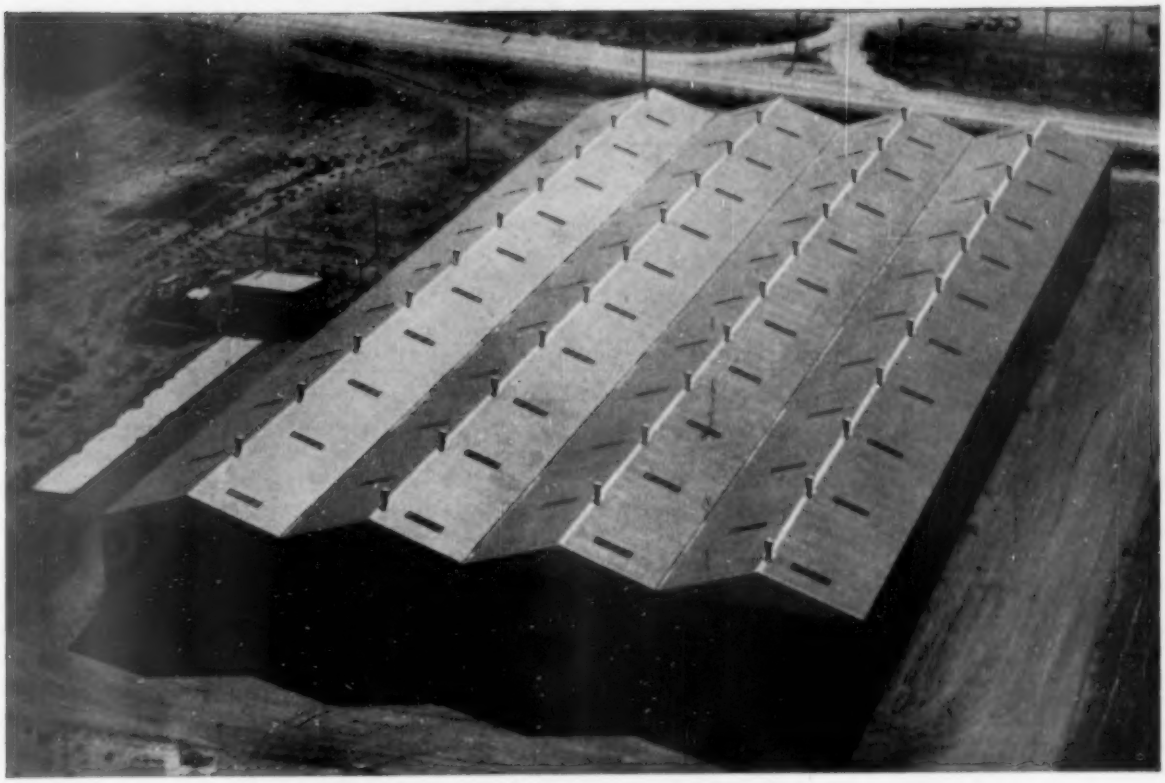

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"For quality roofing at low cost, we recommend Kaiser Aluminum."

The experience of the Kern Rock Co. is typical. Whatever you are building, figure first in Kaiser Aluminum for better value at lower cost.

For A.I.A. File and complete information, contact any Kaiser Aluminum sales office listed in your telephone directory. Or write Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

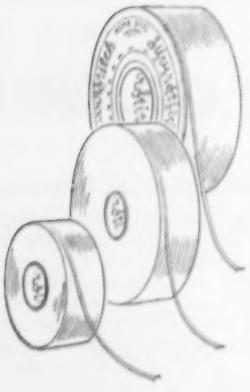
Industrial Roofing and Siding

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

CLOSURE IDEA BULLETIN

For Users of Fibreboard Boxes

Big material and time savings through switching to Acme Steel Wire Stitching may be enjoyed by firms closing 50 or more fibreboard boxes per day by other methods. One out of every three users of stitched fibreboard boxes in the food industry gains production advantages with faster and better quality closures made with Acme Steel Silverstitch Wire.



Silverstitch Wire is electro-galvanized for rust resistance and edge rolled for smooth, trouble-free feeding. Made with unvarying accuracy, Silverstitch comes in 10, 25 and 50-pound coils. Over 100,000 stitches can be made without reloading when Acme Steel 50-pound coils and holder are used.

You can gain important performance benefits by using Acme Steel Arcuate. This revolutionary new process adds to the driving and clinching strength of the stitch without increasing wire size...and box closures are much more secure.

Ask your Acme Idea Man about all the benefits of wire stitching, or write today for complete information: Dept. FAW-116, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois.

ACME STEEL WIRE STITCHING

How LINK-BELT'S complete screw conveyor service

saves you time
spares you details

Here's a single, all-inclusive source for standard or special requirements

This four-point program provides quick and easy answers to any screw conveyor problem. Link-Belt offers you the widest range of component types and sizes. For example, you choose from 17 basic screw designs—in any suitable metal to meet temperature, corrosion, sanitation, abrasion and other requirements . . . in a full range of diameters, gauges and pitches. Whatever you need in components . . . and to whatever extent you require engineering counsel — Link-Belt will devise a system "tailored" to your specific needs. Ask your nearby Link-Belt office or authorized stock-carrying distributor for 92-page Data Book 2289.

◀ **SCREW CONVEYORS** are readily adaptable to inclined (left), horizontal or vertical handling of bulk materials.

1. **ANALYSIS AND ENGINEERING** service is provided by a district sales office in your area. Link-Belt district engineers can quickly ascertain the best conveying arrangement for your specific application.

2. **COMPLETE LINE OF SCREW CONVEYOR COMPONENTS** and related elevating, conveying and power transmission equipment is your assurance that specific needs will be fulfilled most efficiently and economically.

3. **EASY ERECTION** is achieved because of prefitting, match marking, close-tolerance manufacturing and layout drawings. Link-Belt will handle entire erection assignment if you wish.

4. **SATISFACTORY PERFORMANCE** is assured when you rely on Link-Belt as a single-contract source for your complete system. We will accept full responsibility for placing it in operating readiness for you.

LINK-BELT

SCREW CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,068

LINK-BELT'S COMPLETE LINE OF INTEGRATED COMPONENTS INCLUDES:

SCREWS · HANGERS · TROUGHS · SPOUTS & GATES · SHAFTS & COUPLINGS · TROUGH ENDS · DRIVES

Ask these questions, too, when you judge a fluorescent lamp...

Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained brightness, long life, uniform appearance. If you are not entirely satisfied on all counts, your full purchase price will be refunded.

How about quality control?

From raw materials to finished product, every Westinghouse fluorescent lamp is subjected to *480 inspections and tests* before approval for shipment.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

WATCH WESTINGHOUSE

WHERE BIG THINGS ARE HAPPENING FOR YOU!

By REX H. WILSON, M.D., Medical Director
The B. F. Goodrich Company, Akron

Oh My Aching Back!

That ruptured disk can be a toughie for victim and employer. Here's how to spot it—and treat it.

UNTIL last week George was a healthy, active, 48-year old workman. But at that time he began to have severe pain in his lower back. No matter what position he took, it still hurt. His back was twisted to one side. He had to move about with a sort of sliding motion, could feel pain even down his left leg.

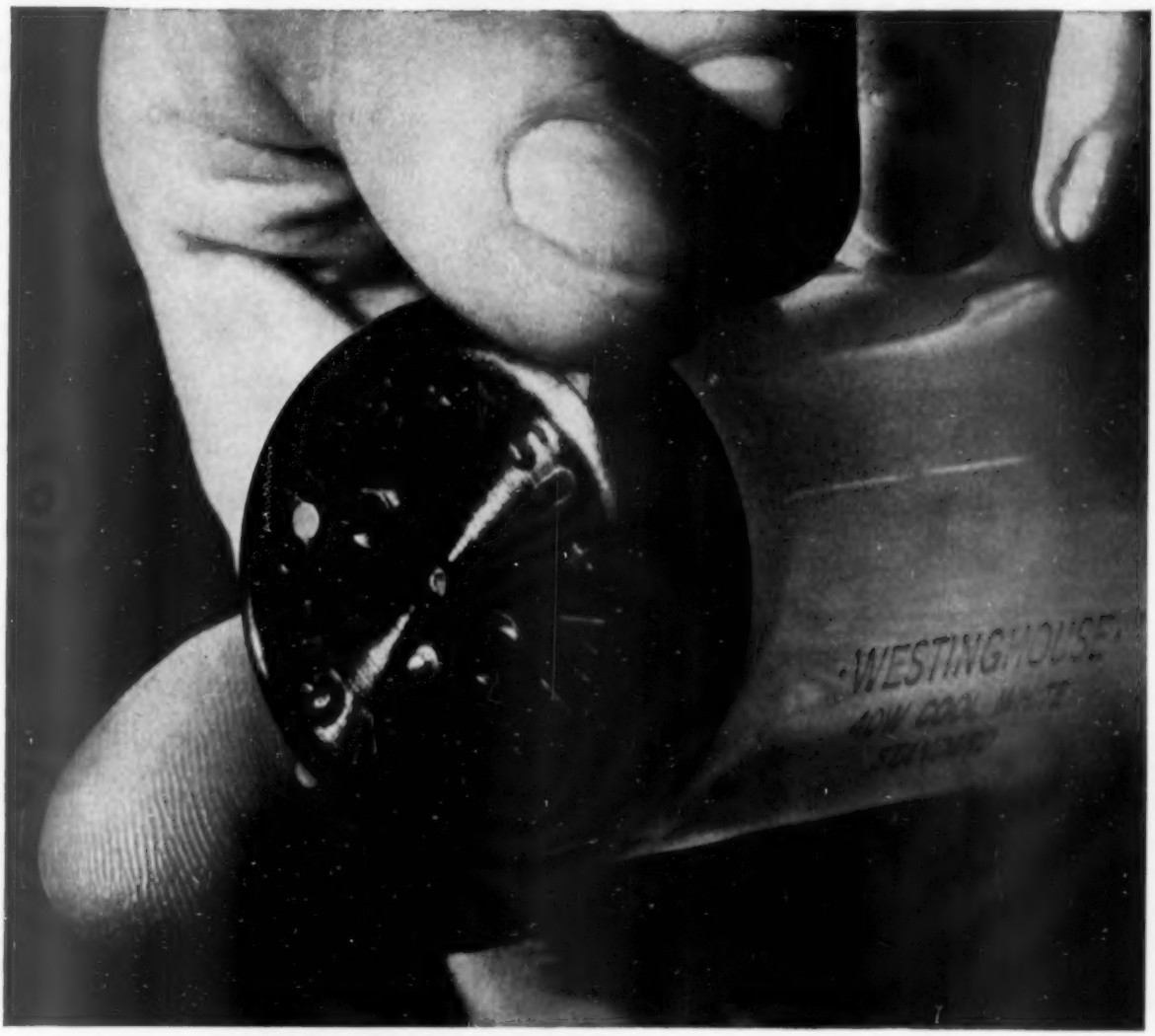
George's siege of pain began after he lifted an overloaded tote box. He felt a "catchlike" sensation in his back. Since then the pain had grown steadily worse. He told the plant doctor the only back injury he could remember was from a fall on an icy sidewalk several years ago. He said his only symptoms then were pain and stiffness in the back that left him in a few days.

The history of back pains is as significant in deciding their cause as are examination, X-ray, physical tests, maneuvers of the back.

Backache is one of the symptoms of many diseases and ailments—various forms of arthritis, infections of the spinal column, many bone diseases, tumors of the spine and spinal column, congenital abnormalities and weaknesses of the spine, even the strain from poor posture. A less frequent but still common cause is a ruptured inter-vertebral disk. This last was George's trouble. And it had started years ago—although this could be difficult to prove at a compensation hearing.

Those poor disks—Between each pair of vertebrae there's a disk-shaped pad of tissue that separates the vertebrae and acts as a protective buffer. Sometimes one or several of these disks will rupture and protrude into the spinal canal. Resulting pressure causes nerve pain. Location of the pain depends on where the protruded disk is. The

how to judge a fluorescent lamp . . . point no. 10



ask about **SECURE SEATING**

Secure seating of a fluorescent lamp means secure positioning of the lamp in its fixture. It's especially important in factory applications, where normal vibration can cause improperly seated lamps to drop out. Westinghouse solves the seating problem two ways. *First*, by means of "guide bumps" on the end-caps (above). *Second*, with uniform, accurate lamp length. The guide bumps are easily felt with the fingers, easily seen; a touch or a glance during lamp installation tells when the lamp is secure in its sockets. Accurate length assures that every lamp will exactly fit its fixture. Result: secure seating for every lamp, with "drop outs" virtually eliminated.

WATCH WESTINGHOUSE
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

FASTER, EASIER SCHEDULING!

Free literature shows how McCaskey Machine Control Board simplifies machine loading, scheduling, dispatching, job assignments

The compact, adaptable unit shows work ahead for each machine or man, keeps work orders in sequence. Adjusts for schedule changes eliminating revision of lists, records and delays between planning and dispatching. Assures operation on schedule. Effective in production, assembly, maintenance or engineering.

We can show you how others have used McCaskey Controls successfully and economically. Let us send you the complete facts.

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VICTOR ADDING MACHINE CO.

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Please send me free literature on how McCaskey Machine Control Board simplifies machine loading, scheduling, dispatching and job assignments.

Name .....

Position .....

Company .....

Address .....

Begins on page 270

legs are involved if protrusion is in the lower spine; arms and shoulders if it's in the upper spine.

In most cases there is tenderness to pressure at the site of the protruded disk. Muscular spasm also may accompany this pressure. It's this that causes the back to twist. If the protrusion persists, numbness and loss of sensation occur in the affected extremity. Eventually muscular atrophy can occur.

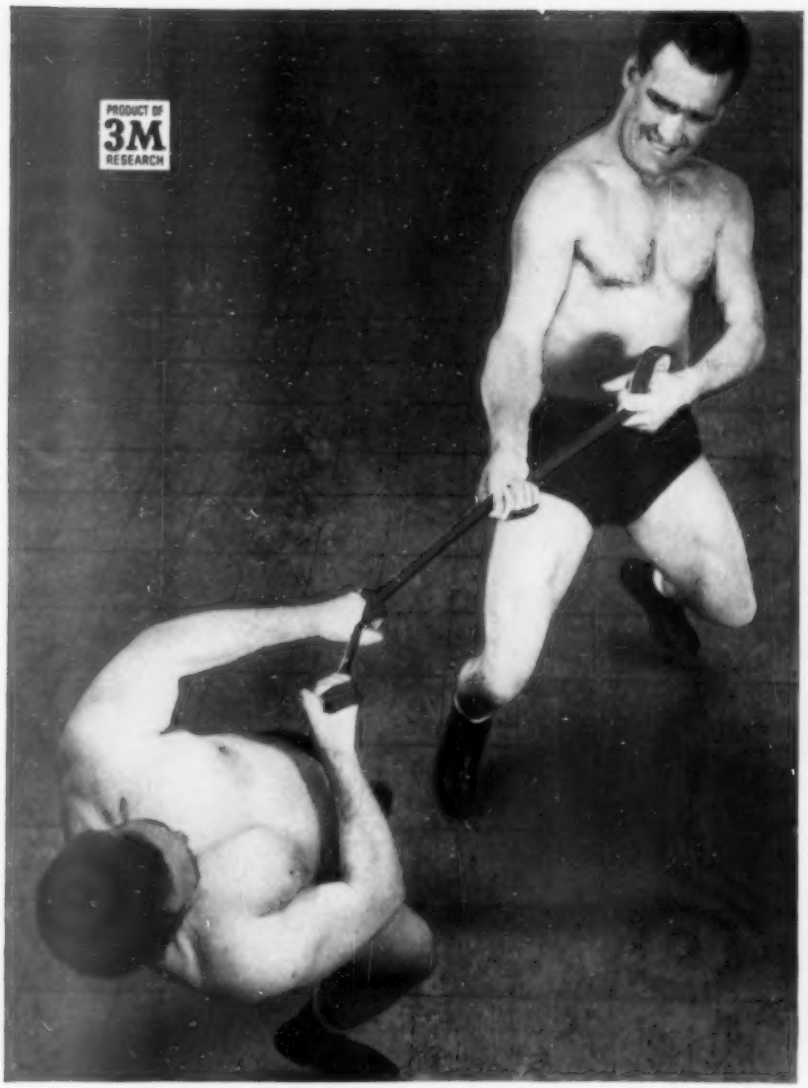
About three-fourths of the cases of ruptured inter-vertebral disks seem to come and go—sometimes without apparent reason. Sudden twists or moderate lifting can bring them on. Yet in a few days all symptoms may disappear. In many cases, like George's, the original injury has occurred several years previously. But there are dissenting medical opinions on this.

Diagnosis—A physician can usually make the diagnosis by direct examination with help of an X-ray. In persistent cases he may make a spinal puncture and examine the spinal fluid. He also can inject an opaque dye into the spinal canal and then take X-rays of the spine. In this way the protruded disk can be located and outlined.

Treatment—If it's a ruptured disk, conservative therapeutic treatment is first employed. Bed boards are placed under the mattress. Heat is prescribed—an electric heating-pad, infra-red irradiation, short-wave diathermy, ultrasonic therapy. When the patient is up and about, he can use braces and corsets to support the back, protect it against sudden twists and turns.

George was put into the hospital —with a bed board under his mattress. Weights and pulleys were attached to his ankles to extend him and separate the spaces between the vertebrae. The disk went back into place, pain disappeared in about 48 hours. During treatment George got sedatives and anti-pain tablets.

But some patients need more than this conservative treatment. After persistent pain, altered reflexes, and loss of sensation, the ruptured disk must be removed by surgery—to free the nerves. Patients should not lift, bend, or stoop for several months after surgery.



World's strongest tape?

Even 468 lbs. of wrestlers can't break it! "SCOTCH" Brand Filament Tape is amazingly strong, super shock-resistant. Thousands of filaments imbedded in the pressure-sensitive adhesive give it up to 500 lbs. tensile strength per inch of width. Four colors: Red, Blue, Black, White and Transparent. Ask your regular tape distributor how you can use it for heavy-duty packaging, or write us direct. Always specify "SCOTCH" Brand, the *quality* tape . . . and *stick* with it!

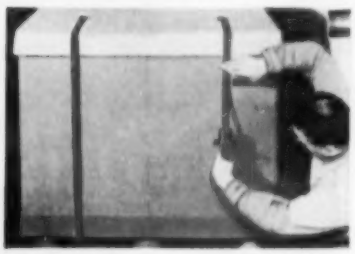
FILAMENT TAPE . . . *one of more than 300 pressure-sensitive tapes for industry, trademarked* . . .

REG. U.S. PAT. OFF.

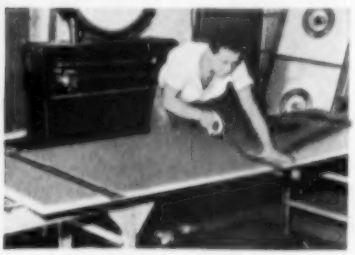
SCOTCH
BRAND

Look what you can do with it!

HARD-TO-HANDLE materials, such as paper sheets in bulk, can be easily packaged using "SCOTCH" Brand Filament Tape. Super-strong tape both seals and reinforces covering.



LARGE cartons and expendable pallets are easily closed and reinforced with "SCOTCH" Filament Tape. Tape won't cut workmen's hands; won't harm contents; is easily disposed of.



MAKE your own containers for odd-sized or odd-shaped products with fibreboard padding and "SCOTCH" Filament Tape. "Mirror surface" adhesive sticks at a touch; holds securely.

SEND FOR free booklet showing how "SCOTCH" Brand Filament Tape can help solve your heavy-duty packaging and materials-handling problems. Write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. CO-116.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

QUIET

as a gentle breeze!

MODEL 7500-B

New ARO

DULCETONE SCREWDRIVER

"Whispers while it works"

Reduce noise to a whisper in your assembly operations . . . cut down operator fatigue . . . use ARO Dulcetone Air Screwdrivers! This slim compact tool runs with a *quiet gentle* exhaust. Light weight . . . 1800 r.p.m. Capacity No. 8 nuts and machine screws. Dulcetone Screwdrivers now offered as standard tools . . . immediate delivery. Ask your ARO Distributor for a demonstration.

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ARO® **AIR TOOLS**
Also...Air Hoists...Lubricating Equipment...Aircraft Products ...Grease Fittings

as practical as a paper plate

new disposable golden

DUST-STOP AIR FILTERS

Save by using them once... then throw your dirt away!

Ever consider the practicality of a paper plate? Use it once . . . throw it away! Nothing to wash, no mess to clean up.

Same thing with new Fiberglas* Golden Dust-Stop* Air Filters. In all kinds of heating and ventilating systems, Fiberglas Dust-Stops are as easy and economical to use as a paper plate. In the long run, they actually *cost less* than cleanable-type filters!

Surprised? Cleanable-type filters *are* re-usable . . . but who wants to? Their initial cost is up to *ten times the cost* of new Golden Dust-Stops —plus the additional expense of labor, solvents, and adhesives for proper maintenance. With new Fiberglas Golden Dust-Stop Air Filters, there's not a bit of cleaning, draining, mess, double handling—or extra investment in spares. And the new *golden* filter now gives you greatly improved handleability!

Want proof? Send for a copy of *A Comparative Study of Air Filtering Costs*. Try a test installation . . . use the data sheet supplied to keep a record of actual costs. Figures will show new Fiberglas Golden Dust-Stop Air Filters are your *best buy*. Write: Owens-Corning Fiberglas Corporation, Dept. 85-K, Toledo 1, Ohio.

Now the best is better than ever!

- *Leading original-equipment, replacement filter!*
- *New improved handleability!*
- *Standard sizes for all central systems!*
- *Less lint surface-loading!*
- *Higher efficiency, longer life!*
- *Tested by Underwriters' Laboratories!*

OWENS-CORNING FIBERGLAS

DUST-STOP AIR FILTERS

*T.M. (Reg. U.S. Pat. Off.) O-C.F. Corp.

Now "trouble" belts become trouble-free!

LEADING CONTAINER MANUFACTURER REPORTS:

No downtime or excessive take-up in over 3 years' operation with premium V-belts reinforced with DACRON

REG. U. S. PAT. OFF.

Ordinary V-belts used on this 2-color carton printing-slotting machine created a costly stretch problem for a prominent container manufacturer in the South. Frequent downtime for take-up was expensive, and shock loads were cutting total belt life to only 6 months.

Three years ago, this manufacturer switched to premium V-belts reinforced with Du Pont "Dacron"*. After 3 years' constant operation at 44 hours a week, the original set of V-belts made with "Dacron" polyester fiber is still in use—and there's been no belt failure or need to adjust for stretch. From the day premium V-belts reinforced with "Dacron" were installed, they've saved this manufacturer money.

For *your* next drive, investigate the advantages of premium V-belts made with "Dacron". They combine the unique properties of the "Dacron" yarn made by Du Pont and the highest skills of leading V-belt manufacturers. E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Del.

**"Dacron" is Du Pont's registered trademark for its polyester fiber.*

6 REASONS FOR USING PREMIUM V-BELTS REINFORCED WITH "DACRON"

- Transmit up to 40% more horsepower, depending upon belt construction.
- Withstand greater shock loading.
- Longer flex life.
- Cut downtime.
- Low stretch.
- Require less maintenance.

Dacron *in V-Belts* DU PONT

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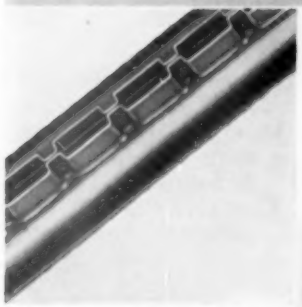
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

The Magnificent Modine

establishes a new concept in gas unit heater styling and performance

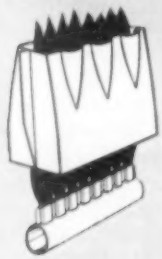


SELF-CLEANING PORTS

Knife-sharp stainless steel ports have four times the free area of drilled ports. Keen edges resist lodging of dirt and scale, maintain uniform flame.

IMPROVED COMBUSTION

Hooded combustion air inlets directly below each tube assure higher burning efficiency, minimize flame disturbance, eliminate combustion chamber.



FASTER, MORE UNIFORM HEAT

Continuous, uniform flame from front to rear of individually and directly-fired tubes boosts radiant heat absorption and uniform heat distribution.

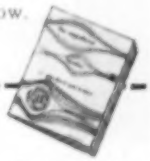
SAFETY MEASURE

Sturdy guard protects against hazards of exposed fan and provides resilient suspension for motor and fan assembly, further reducing vibration noises.

HERE at last is a gas unit heater so strikingly beautiful it can be installed with pride in the finest industrial, commercial and institutional buildings. Truly distinctive lines and attractive soft green finish are accented by sparkling medallion, grilles and panel of polished chrome. Yes, the new Modines are in a class by themselves—thanks to the skill of famous designer Jean Otis Reinecke.

And the new Modines are as great as they look—in performance, in economy . . . in safe, trouble free operation. Check the benefits shown at left. And, remember—improved *stainless steel* burners, plus a choice of *stainless or aluminized steel* heat exchangers, make Modines up to *50% lighter* than other units . . . less expensive to ship and install.

Ask the Modine representative listed in your classified phone book for full facts on the eight AGA-zpproved sizes—25,000 to 310,000 Btu. Or use the handy coupon below.



MODINE MFG. CO.
1505 DeKoven Ave., Racine, Wis.

Please send me immediately a free copy of new bulletin, "The Magnificent Modine Gas-Fired Unit Heater"

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GU-1307

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GAS UNIT HEATERS

In Canada: Sarco, Ltd., Toronto

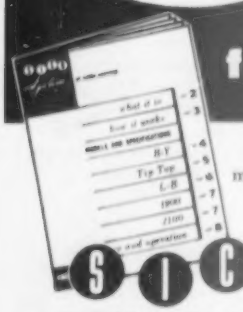
problem:

how to get
added space
without
added building costs

solution:
folding tables
from the SICO system!

Now you can actually *add space* to your plant *without spending a penny* in construction costs . . . with the SICO System! Convert any urea into a conference room, cafeteria, etc., in a matter of minutes with SICO folding tables . . . easily, safely, quietly!

Tables in the SICO System require minimum storage space; they roll easily into position and can be set up by one person in seconds, they're built for heavy duty service, lasting beauty, and require little maintenance. *Most important of all* . . . they give you that *extra space.*



free

Booklet shows how you can make *any* room a *multi-purpose* room! Write:

SICO

manufacturing company
Dept. 613, 5215 Eden Avenue So.
Minneapolis 24, Minnesota

FACTORY / CATALOG NEWS . . . *Begins on page 158*

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

chinery—including chains, conveyors, drives, and processing units. Contains directory of further technical literature on these subjects, and list of company's world-wide agents. *Link-Belt Co.*

18—Lift Trucks. 25 models, 1000- to 30,000-lb. capacity, are described in 12-page, 2-color brochure 1487. Illustrates "Space Saver," "Monomast," and "Karry Krane" lines; "Load-Grab" and other lift-truck attachments. *Hyster Co.*

19—Pallet-Type Steel Boxes. An 8-pager on the features, construction, and uses for line of alloy-steel fold-up containers. Specifications; and photos of handling, storage, and shipping applications. *Hamlin Metal Products Co.*

20—Packaging & Carloading. 17th edition of handy pocket-size guidebook offers 48 packed pages of strapping, seals, tools, grain doors, retaining strips, etc. Materials are pictured and described, with instructions on their application. *Signode Steel Strapping Co.*

21—Fork Trucks. Construction details, operating characteristics, maintenance features of six-model line are covered in 16-page, 3-color brochure. Illustrates Hydratork drive; two separate braking systems; how to prepare vehicles for major servicing. *Clark Equipment Co.*

22—Gravity Conveyors. Bulletin 801 gives the facts in three sections on: 1) wheel types; 2) roller types; 3) curves and accessories for setting up a conveyor system. Includes complete specifications, installation photos, details on coupling. 8 pages. *A. B. Farquhar Div.*

23—Overhead Systems. Booklet 2008-M (12 pages) gives details on track design and support. Illustrates carriers for hand, electric and automatic operation; track switches; standard, transfer, and gantry cranes; safety electrification; buckets and grabs. *The Cleveland Crane & Engineering Co.*

24—Tractor Shovels. Here's an informative bulletin (No. 304) that reports on bulk-materials-handling methods in a number of different plants. The case histories are amply illustrated, and specifications are noted. This is an 8-pager. *The Frank G. Hough Co.*

AIR HANDLING

25—Recirculating Units. No CH-3D provides detailed data and description on process cooling units—including "package," "junior," and special explosion-proof models for hazardous operations. Specs on all models in easy-to-read chart form; selection tables. 4 pages. *Mayer Refrigerating Engineers, Inc.*

26—Air Conditioning. This 12-pager is packed with performance charts, photos and drawings, information about new products, including a remote manual control and five types of air diffusers (types for ceiling and high wall mounting). *Anemostat Corp. of America.*

27—Blowers. Bulletin B-154A (4 pages) contains useful engineering data on blowers adaptable to either pressure or vacuum service. Selection charts give model, brake hp., and rpm. needed to provide specified air-moving capacities. *Blower Div., Read Standard Corp.*

28—Systems. Folder M-133 lists and describes blowers, exhausters, pneumatic systems, filters, flotation equipment, separators, stills, smooth-flow tubular pipe and fittings, and vacuum cleaners for industrial use. 4 pages. *Industrial Div., U.S. Hoffman Machinery Corp.*

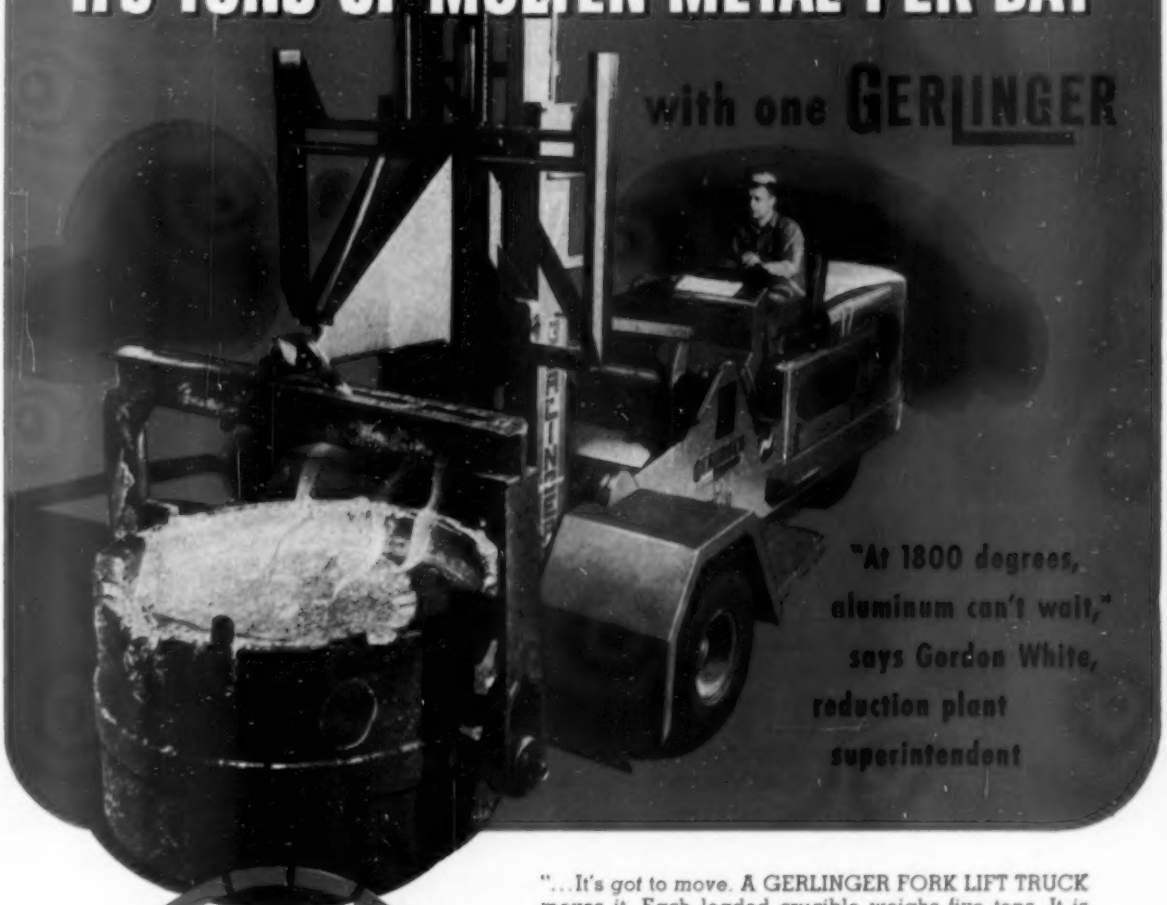
29—Mountings. Plate form and multi-plane mountings to isolate vibration on air conditioners, blowers, and similar units. Bulletin 702 (16 pages) tells all about them—engineering data, performance curves, specifications. And gives illustrated installation information. *Lord Mfg. Co.*

Turn the page

Reynolds Metals Co. moves

175 TONS OF MOLTEN METAL PER DAY

with one GERLINGER



"At 1800 degrees, aluminum can't wait," says Gordon White, reduction plant superintendent

JOB PROVED

"...It's *got* to move. A GERLINGER FORK LIFT TRUCK moves it. Each loaded crucible weighs five tons. It is moved through heavily trafficked areas safely. Twenty-four hours a day the GERLINGER is on duty doing hot, heavy, machine-killing work. It is done with speed, dependability and safety."

Reynolds needed a special attachment to grasp the crucibles in their northwest reduction plant. "Custom-engineering" for a specific handling problem is both routine and regular with Gerlinger, and here was another opportunity to provide *Job-Proved* equipment that would expedite handling.

For more profitable payloads in YOUR industry...for newer ways to do an old job better and faster...phone, wire, write Gerlinger Carrier Co. *They build the answer.*

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Material Carrier catalog..... ☐

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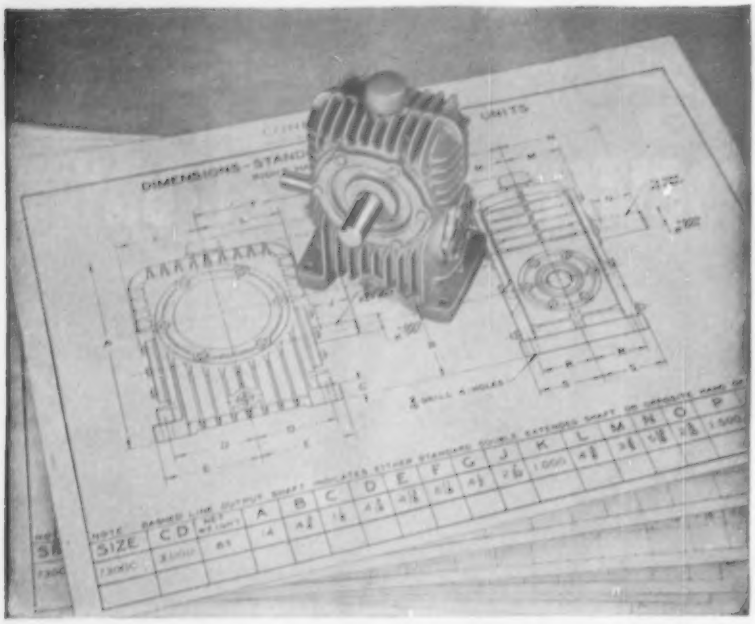
GERLINGER PRODUCTS

G-623



DIMENSIONS ONLY TELL HALF THE STORY...

. . . about worm gear speed reducers. You've got to compare size with load capacity for the whole picture. Inside a Cone-Drive speed reducer you'll find the double-enveloping worm gear design that makes it the most efficient right-angle speed reducer available.

Take the standard 3" center distance unit above for example. Here are its Class I Service Ratings with a 5:1 reduction:

Worm RPM	100	200	300	580	720	870	1150	1750
Mech. HP	1.24	2.21	3.08	4.89	5.61	6.34	7.41	9.04
Thermal HP	1.24	2.21	3.08	4.20	4.62	5.10	6.00	7.80
Output Torque (inch-lbs.)	3340	3010	2830	2405	2250	2150	1940	1575

That's a lot of capacity for a unit that occupies less floor space than this magazine page. But it's typical of Cone-Drive speed reducers and gearsets. Complete details on this model in Bulletin 600-C. Other units to 800 HP and ratios to 4900:1.

CONE-DRIVE GEARS
Division Michigan Tool Company
DOUBLE ENVELOPING GEAR SETS & SPEED REDUCERS
7171 E. McNichols Road • Detroit 13, Michigan

FACTORY / CATALOG NEWS
Begins on page 158

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

MATERIALS

30—Liquid Bonding Agent. Thorobond, for sealing interior and exterior masonry surfaces, is subject of two circulars (Nos. 17 and 48) that show how it can correct water problems above or below ground. *Standard Dry Wall Products, Inc.*

31—Hard & Resin Rubber. Here's a comprehensive folder containing detailed application and characteristic charts; molding tolerances. Guide to selecting compounds for general needs, reducing costs of molds and fabricated parts. 4 pages. *Stokes Molded Products Div.*

32—Insulation. Irrathene (irradiated polyethylene insulating material) combines overload protection with electrical and physical properties of conventional polyethylene. Fully described in a 12-page, illustrated technical report (CDD-I-2). *General Electric Co.*

33—Glossary of Plastic Terms. Confused by all the new (and multi-syllable) words? Well, here's a listing of some 85 definitions—including terms such as bonding strength, center expansion, delamination, postforming, and thermoplastic. *The Richardson Co.*

MECHANICAL

34—Precision Bearings. 128-page Catalog 52-A lists complete line, including pre-lubricated and sealed models. Features section on engineering data and formulas for use in determining numerical values for various loads to which bearings are subjected. *McGill Mfg. Co.*

35—Motor Drives & Pulleys. Two 8-pagers: Bulletin 1610-B1 P covers ½- to 25-hp. variable speed drives, with positive pulley adjustment; tells how to select them for your needs. 1630-B1 P is on ⅛- to ¾-hp. motor pulleys. Pix, diagrams, ratings. *Worthington Corp.*

Turn to page 284

LAY THAT PISTOL DOWN PAL

There's an easier way out of your bearing troubles

Russian roulette may seem to be the easiest and quickest way out when bearings start to go and production starts to stop. But quicker still is a replacement from an authorized **SKF** distributor. He's the man to see for *all* types of anti-friction bearings and pillow blocks, and he's the man who will give you prompt service 24 hours a day. This factory trained specialist is ready to help you select the right bearing for the job. His broad experience in solving problems of maintenance means proper guidance in protecting your bearings for longer life. Doing business with the right distributor—the **SKF** distributor—is good business and good assurance of getting the bearings you need when you need them.

7746

SKF®

EVERY TYPE—EVERY USE

Ball Bearings
Cylindrical Roller Bearings
Spherical Roller Bearings
Tapered Roller Bearings ("Tyson")

*Reg. U. S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

Owner Says "EXPANSION IS EASY WHEN YOU OWN AN ARMCO BUILDING"

Pictures Show How He Enlarged Building as Business Grew

Office and shop of Wilcox Sheet Metal Company, Middletown, Ohio, was erected in 1949. The original Armco Building was 28 feet wide by 60 feet long.

By 1951, more floor space was needed. Owner, G. W. Wilcox, reports the expansion was easy. He simply ordered roof and wall parts for a 29-foot-long extension. Some of the original endwall panels were left in place to provide a partition, some of them were moved to the endwall on the addition.

With the addition completed, it is practically impossible to tell the old from the new. The result, an attractive, weather-tight building, big enough for today's business—and ready to be extended again if need be.

You need never outgrow an Armco Steel Building. STEELOX Panel construction makes it easy to rearrange your building to fit new conditions, add more length, relocate doors and windows, or erect a companion span. Building parts are inventoried to help you do the job quickly and conveniently.

Write for Complete Information

Tell us about your building needs. You can meet practically any floor space requirement with an Armco Building. Lengths and widths are unlimited. Clear-span widths up to 60 feet. Armco Drainage & Metal Products, Inc., 5046 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO STEEL BUILDINGS

ARMCO®

Today's Higher RLM Specifications make the RLM LABEL for INDUSTRIAL LIGHTING UNITS More Significant than ever before!

...More Significant than ever

because Today's RLM Specs assure even higher Operating Efficiency, Better Performance and Longer Life:

- Higher light output
- More seeing comfort
- Better protection against glare
- Increased brightness control
- Greater reduction of light loss
- Lower-cost installation
- Easier relamping
- Greater safety from electrical hazards
- Greater protection against corrosion

R-1523

The RLM Label affixed to a lighting unit is a Certificate of Assurance. It assures the buyer that the equipment meets or exceeds important quality standards established by the RLM Standards Institute. As shown by the partial list of user benefits at left, these higher standards make the RLM Label more significant to everyone who buys, sells or specifies industrial lighting equipment.

You can rely on this warranty. It is upheld by the extensive RLM Inspection and Certification Program—the real backbone of the RLM Label. Periodic inspections are made by an independent laboratory. Lighting units are checked for conformance to RLM Standards as they come off assembly lines and at all levels of distribution.

This latest edition RLM Specification Book will acquaint you with the full significance of the RLM Label today. Your copy is available without cost or obligation from: RLM Standards Institute, Suite 829, 326 West Madison Street, Chicago 6, Illinois.

RLM STANDARDS INSTITUTE
INCORPORATED

MOVING

RICE, GRAIN, COFFEE

BY THE TON

Clean grain is a "must" for all storage plants and food manufacturers today, and Spencer Vacuum is leading the way to sanitary and safety methods which in most cases exceed the legal requirements. In every case, Spencer is lowering the cost of good housekeeping.

Grain elevators insure the quality of their products by installing stationary vacuum systems which may be as small as ⅞ HP or run up to 50 or a 100 HP. This is the only way to remove overhead dust which might eventually fall on the products. It also reduces the amount of dust and therefore, the danger of explosion. Rodents and vermin gain little headway in a Spencer cleaned granary or food plant.

One of the largest breweries in the country uses a 7½ HP Spencer Stationary system with static proof collection hoses and vacuum outlets in all grain handling areas. Spencer gathers all of the dust in one central location for disposal. Ask for Bulletin 155. 512-G

LEADERS IN INDUSTRIAL VACUUM FOR 25 YEARS

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

Ask for Bulletin 107-D

Unusual Uses for Spencer Turbo-Compressors

The Spencer Turbo provides high volumes of air at low pressures—4 to 160 oz. They are a standard for oil and gas fired heat treating equipment and 100 other uses.

For instance:—agitation, boosters, cooling, drying, scale blowing, spraying, and ventilating.

These and other applications are completely described in the Spencer Turbo Compressor Data Book.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

FACTORY / CATALOG NEWS
Begins on page 158

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

36—Internal Gear Rotary Pumps. "Continuity" catalog uses three colors and handy tables to guide reader in pump selection. Easy-to-follow copy, photos, drawings describe size, rotation, port positions, bases, weights of five pump series. 20 packed pages. *Wayne Pump Co.*

37—Mill Bearings. Booklet 2665 describes heavy-duty line for shaft diameters up to 11 in. Devices have self-aligning roller bearings and steel housings, for use with severe radial and thrust loads. Illustrated 8-pager includes dimension and rating data. *Link-Belt Co.*

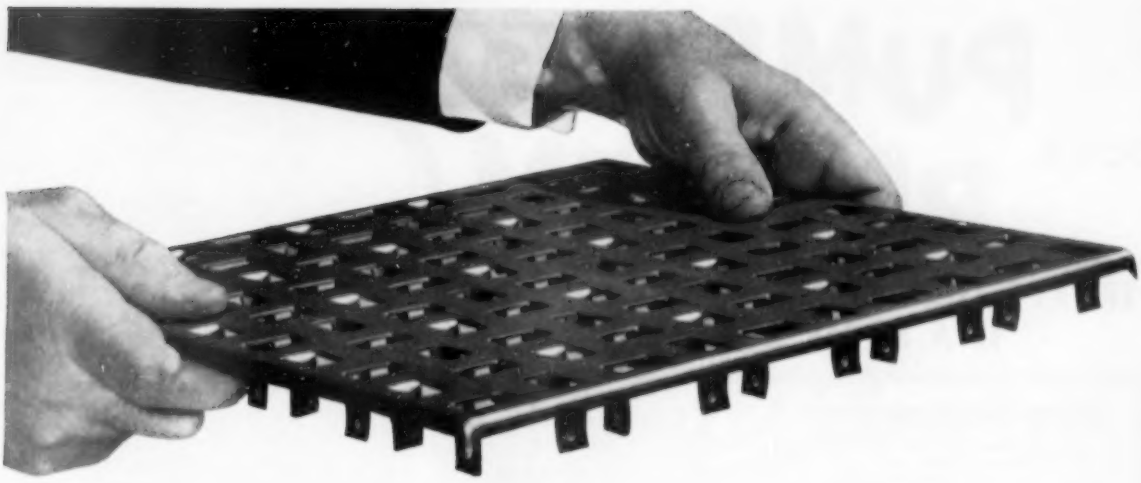
38—Drives & Pulleys. Two 2-color 8-pagers: No. G-561 details Vari-Spin drive model used for spinning frames and twisters, has large dimension diagrams; V-563 covers low-cost ¼- to 1½-hp. pulley line, gives diagrams, charts, rating tables. *Reeves Pulley Co.*

39—Roller Bearings. Here's a 56-pager with comprehensive tabular info on radial static and dynamic capacities, plus thrust capacities. Application and bearing data, with engineering formulae, graphs, drawings of representative installations. *Rollway Bearing Co., Inc.*

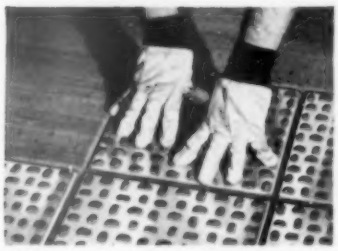
40—Coupling Selection Chart. Condenses critical specs for three types of couplings: roller chain, Morflex, and silent chain. Horizontal headings give types with bore dia. range.; provide color cross-reference with appropriate shaft size. 22x17 in. *Morse Chain Co.*

41—Flexible Couplings. Bulletin 203 describes bonded rubber types, torque capacities from 1/80 to 3500 hp., that don't need lubrication. Illustrates applications on a cutter grinder, generator drive, propulsion drive, window lift, and food blender. *Lord Mfg. Co.*

42—Pumps. Types DL (grease-lubricated) and DM (oil-lubricated) are subject of colorful 12-page Bulletin No. B-1608. Describes and



...the floor that heavy loads can't lick!



Easy and Quick

1. Installed quickly in reasonably dry concrete topping . . . no hand trowelling. Plate won't work loose, weave or rattle.
2. Safe—wet or dry. Friction surface, even with wet or oily conditions. Plenty of traction.
3. Maintenance no problem with foot-square sections. Make spot repairs on old damaged floors. Keep inventory for emergency use.

Acme Steel Floor Plate... rugged floor protection from 74% steel and 26% concrete

For new or old floors—One hundred barbed prongs in every foot-square piece anchor this new Acme Steel Floor Plate securely in concrete. You get easy-to-install, long-wearing floors that stand up under the heaviest pounding of plant traffic . . . AND you reduce downtime for repairs. Quick patching of old, worn floors can be done overnight or on the weekend with Acme Steel Floor Plate in fast-drying, hard cement mastics. Ready for use in a matter of a few hours!

For complete information, write: Dept. FAF-116, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois

ACME STEEL **FLOOR PLATE**

GOT A PUMPING PROBLEM?

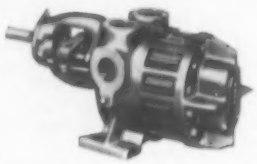
PERHAPS THE ANSWER YOU'RE LOOKING FOR IS A ROPER ROTARY PUMP

ROPER PUMP-MOTORS

These units offer low-speed and high-torque, and their versatility finds them well-suited to heavy-duty service within their operating range. In general, recommended speed is 200 to 800 R.P.M. with pressures to 800 P.S.I. In this range, they require from 7 to 40 G.P.M. flow and will develop up to 11.5 H.P. output at maximum speed and pressure.

ROPER SERIES F PUMPS

Among the dependable Ropers is the Series F Pump — pressures to 300 P.S.I., sizes 1 to 300 G.P.M. It features four-port design with 8 optional piping arrangements . . . supplied in standard fitted models. With packed box or mechanical seal; with or without relief valve.



ROPER SERIES K PUMPS

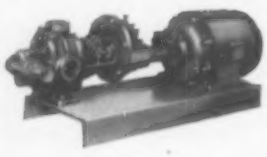
Operate your hydraulic circuit with the correct size Roper for the particular job. In many cases the Series K will do, for it is rated from pressures to 150 P.S.I., capacities ⅜ to 50 G.P.M. This model is compact, sturdy . . . is self-lubricated by liquid pumped. Comes with packed box or mechanical seal . . . with or without relief valve.

ROPER SERIES H PUMPS

Lower maintenance costs with a Roper. For instance, a pump like the Series H with pressures to 1000 P.S.I., sizes 10 to 75 G.P.M. is ideally suited for hydraulic mechanisms and for other applications requiring high pressures. Spur gears run in axial hydraulic balance . . . roller bearings and bronze wear plates reduce friction. Available with packed box or mechanical seal.

ROPER SERIES 3600 PUMPS

You'll profit more with dependable Roper Series 3600 Pumps on the job . . . they are speedy, quiet, and plenty rugged. Service-proved features such as self-lubrication, adjustable relief valve, hardened gears, and mechanical seal contribute to Roper dependability. Sizes range from 40 to 300 G.P.M.; pressures to 60 P.S.I.



GEO. D. ROPER CORP. 191 BLACKHAWK PARK AVE., ROCKFORD, ILL.

SEND NOW FOR DESCRIPTIVE BULLETINS

ROPER *Rotary Pumps*

FACTORY / CATALOG NEWS
Begins on page 158

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illustrates complete line—with specs, sectional and plan views, performance charts, design and construction features. *Peerless Pump Div.*

43—Variable Speed Drive. Two bulletins describe drive that can be had with a complete line of automatic and remote controls. No. 521 (8 pages) illustrates the unit; C-100 (4 pages) covers the types of controls—electric, pneumatic, from recorder. *Graham Transmissions, Inc.*

44—Airflex Line. 36 pages about clutches, brakes, couplings, power take-offs, rotorseals, quick release valves, and high-speed controls. Design data, tables, drawings; application photos on metalworking, paper, rubber, and miscellaneous machinery. *Fawick Airflex Div.*

45—Power Transmission Machinery. Expansive 328-page engineering catalog D56 covers all types—base plates, bearings, chains, clutches, collars, couplings, flexidynes, keyseats, pulleys, shafting, speed reducers, sprockets, take-ups, bushings, etc. *Dodge Mfg. Corp.*

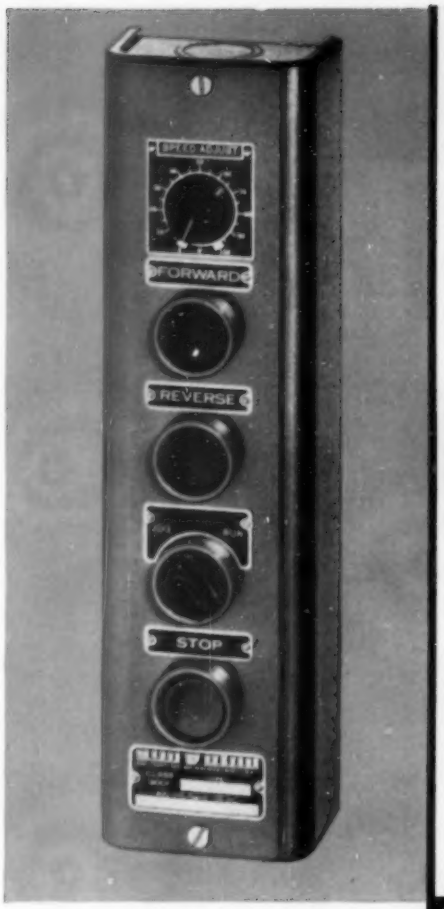
INSTRUMENTS & CONTROLS

46—Photoelectric Controls. Bulletin PA 561 (24 pages) gives detailed specifications, descriptive data, operational charts on photoelectric systems for: conveyor control, counting, inspecting and sorting, smoke detection, and so on. *Electronics Corp. of America.*

47—Meters & Controls. Over 100 measuring, transmitting, receiving, recording, and indicating components for power and process applications are described in 8-pager (G15-1). Literature reference for each product. *Bailey Meter Co.*

48—Pan-a-Trol. Here's a 12-page, 4-color booklet (GEA-6334) about packaged control for industry. Gives

Turn to page 290



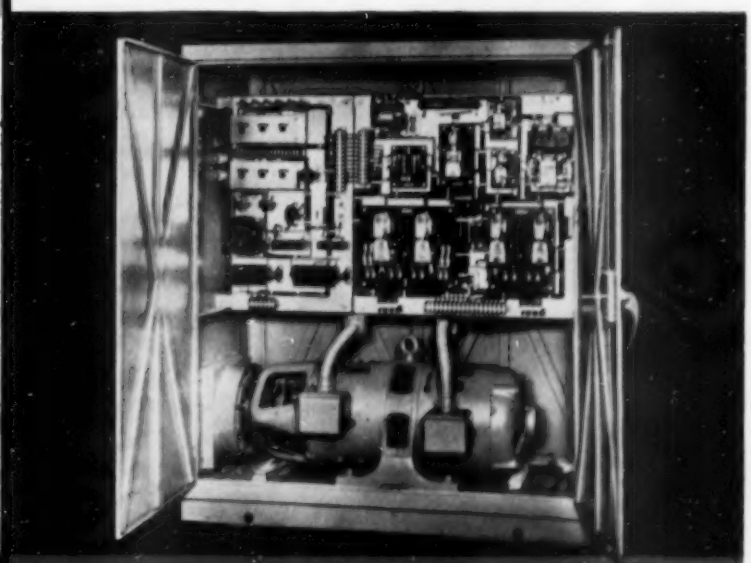
The "Unseen Hand" at the Controls . . .

AUTOMATICALLY SENSITIVE

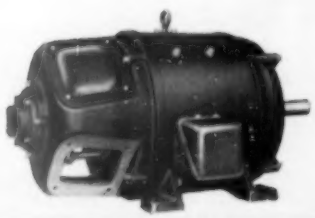
Performance-Rated©

Century SELECTIVE SPEED DRIVE

More accurately than the most experienced operator, Performance-Rated Century Selective Speed Drives *automatically* adjust motor speed to meet operating requirements. Speed changes are integrated with varying pressure, temperature, viscosity or size of the material being worked. You can also use Century Selective Speed Drives for starts, stops and jogs—forward or reverse—as required.



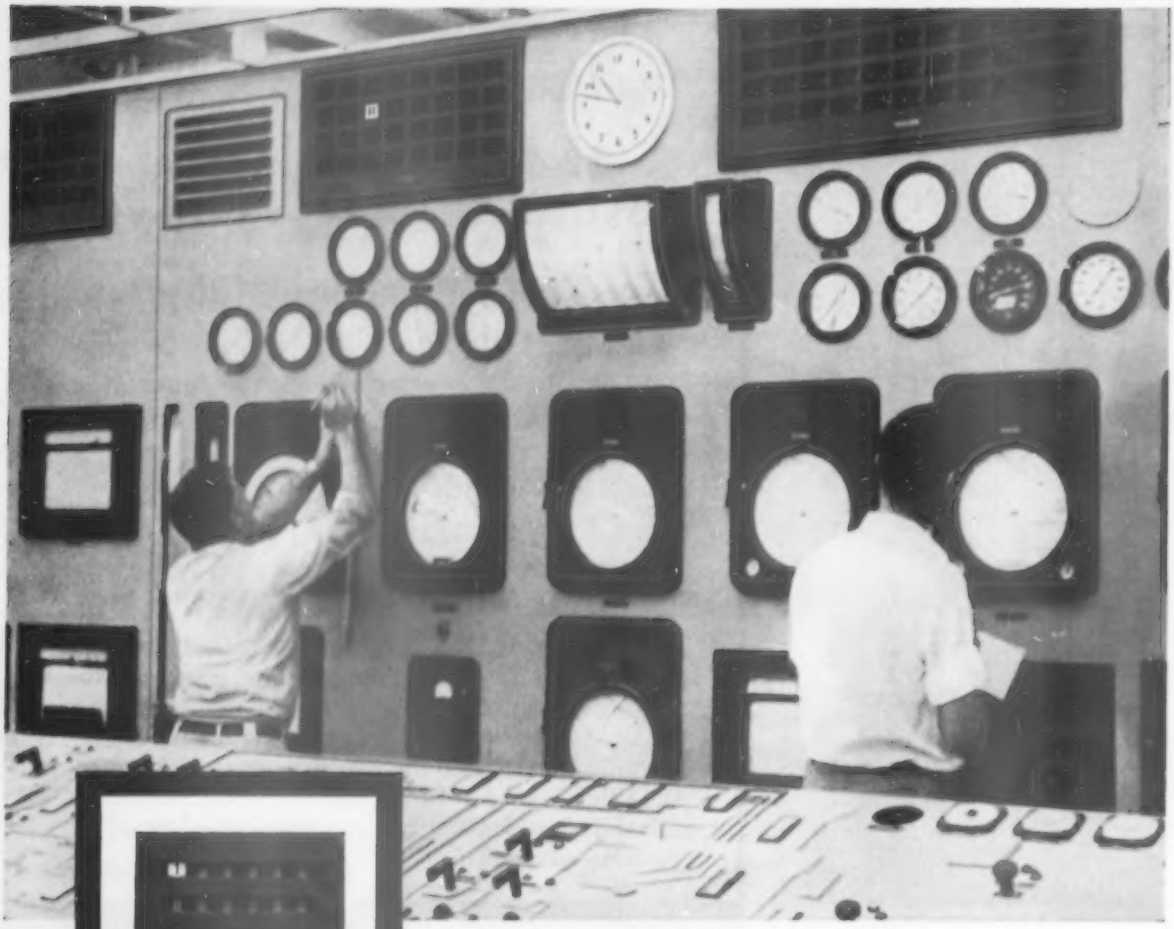
For full information and assistance on any motor drive application, AC or DC, call your nearest Century Sales Office . . . or write us direct.



Performance-Rated© 1/8 to 400 H. P.

CENTURY ELECTRIC COMPANY

1806 Pine St., St. Louis 3, Mo. • *Offices and Stock Points in Principal Cities*



PREVENT COSTLY INTERRUPTIONS WITH...

DEPENDABLE EDWARDS ANNUNCIATORS

Interruptions are costly, even when no damage is caused. Make *sure* your "trouble" warnings are instant and accurate, in plenty of time to correct any trouble, with dependable *Edwards* annunciators.

Whatever your specific requirements for alarm indication, Edwards offers a complete line of drop or lamp type annunciators. Edwards 80 years of specialization in the design and manufacture of signaling equipment assures the ultimate in quality and reliability.

With today's high fixed production costs, it pays more than ever before to specify *Edwards* annunciators as your "insurance" against production interruptions. For complete information, contact your Edwards Technical Specialist or write Dept. FM-11, Edwards Company, Inc., Norwalk, Connecticut. (In Canada, Edwards of Canada, Ltd., Owen Sound, Ontario.)

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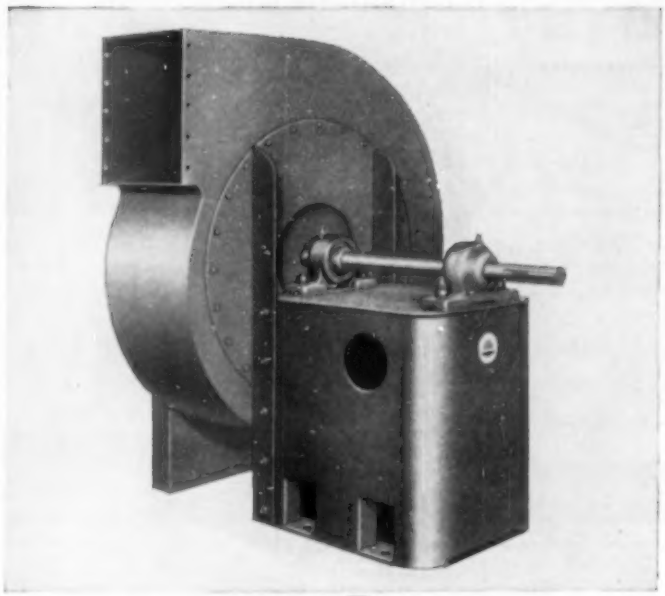
EDWARDS

DESIGN • DEVELOPMENT • MANUFACTURE

NEW FEATURES! HIGHER EFFICIENCIES! NEW "3-IN-1" DESIGN!

AMERICAN BLOWER SERIES 106 INDUSTRIAL FAN



Series 106 Industrial Fan

Certified ratings! Pressures to 18" w.g.! Volumes to 125,000 cfm! Heavy construction! Choice of 3 special-duty wheels! You get all these features, and many more in American Blower's new Series 106 Industrial Fans.

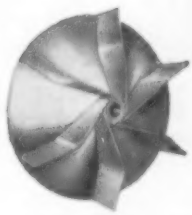
Available in 16 sizes, each with a high efficiency rating. Series 106 fans offer a wide range of optional accessories and construction features to meet standard or special specifications – *or* you can buy it in 7 sizes as an efficient, heavy-duty "packaged" industrial fan, complete with motor, V-belt drive and weathertight running-gear enclosure.

Get complete data from your nearest American Blower Branch Office, or write for Bulletin 5306-H.

Choose the wheel to fit the duty

Air Handling – for efficient handling of air, fumes, or gases – either clean, or containing light concentrations of dust or materials.

Material Handling – efficiently handles air or gases containing granular material – dust grain, exhaust from buffing or grinding wheels.



Long Shavings – specially designed for conveying or handling air or gases containing long stringy material – wood shavings, fibers, alfalfa.

American Blower products serve industry

- Air Conditioning, Heating, Ventilating Equipment
- Mechanical Draft Equipment
- Industrial Fans and Blowers
- Centrifugal Compressors
- Gyrol Fluid Drives
- Dust Collectors
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CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
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AMERICAN BLOWER

For HIGH LIFTS and *FAST TRAVEL* with HEAVY LOADS

Here is a typical monorail type, motorized trolley

EUCLID *TRAVELING* HOIST

It has a capacity of 15 tons and is equipped with a four part cable and a large drum to afford an unusually high lift.

Similar hoists are available in capacities up to 30 tons with geared or powered trolleys; with two hooks, if needed; also with push button, pendant or remote controls. Larger hoists may be had with operator cabs for inside or outside use.

Euclid's broad experience enables its engineers to design special types of grappling equipment for use with cranes or hoists. Counsel is available without obligation. Consult us.

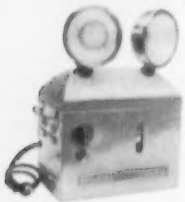
THE EUCLID CRANE & HOIST CO.
1364 CHARDON ROAD • CLEVELAND 17, OHIO

WRITE FOR CRANE CATALOG

ONE more hour of DANGER!

STANDARD TIME

The return of shorter days is a reminder that darkness means added hazards to people and property. For almost half a century, Carpenter-Lights have guarded against the dark and the consequences of light failures. For *dependable* emergency lights, specify CARPENTER.



"AUTOMATALITES" The finest protection against panic and injury. Automatically, instantly, illuminates large areas or pinpoints critical controls with two powerful, sealed-beam floodlights. Essential wherever people congregate or where vital operations must go on. Many types, including explosion-proof and remote control, available. U/L APPROVED.

"PORTALITES" For applications requiring high-intensity, portable searchlights or work lights, CARPENTER'S "Portalites" are highly recommended. Many types and sizes to choose from. Illustrated model has rechargeable battery and two-way switch giving choice of mile-range searchlight or 24 hour continuous work light.

CARPENTER Makes: "Portalites" "Automatalites" Stationary and Automotive beacons Automotive Spotlights Marine Lights and many others

NEW! "HYDRO-CAPS" Send for details about these marvels that return the water to your batteries. Cuts maintenance costs, prolongs battery life. Send coupon below.

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Send details on: ☐ "Portalites" ☐ "Automatalites"
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at-a-glance application information; lists design, installation, maintenance, and field service features. Includes a typical case history. *General Electric Co.*

49—Fireye Systems. Series AC panel control systems for all automatic oil, gas and combination oil/gas burners is described and pictured in 16-page Bulletin CA-22. Application, operation, components, dimensions; also a selector guide. *Electronics Corp. of America.*

ELECTRICAL

50—Electronics Parts. 1957 edition is a walloping 356-page catalog of equipment for industrial maintenance, research, and production. Lists over 27,000 items (160 pages in rotogravure and 4-color covers). Includes components, kits, accessories. *Allied Radio Corp.*

51—Transformers. 26-pager contains 2-color illustrations and engineering specs for variety of regular and custom units. Lists open-frame, cased, channel-frame, end bell cased models; special air core reactors, heater-, output-, furnace-transformers. *Nothelfer Winding Labs., Inc.*

52—Motors. Two Bulletins (GEC-1026A and -1027A, each 11 pages) give buying information for group of fractional hp. motors; integral-hp. polyphase and single-phase induction motors, motors and control for part-winding starting, types of gear-motors. *General Electric Co.*

53—Wall-to-Wall Lighting. Handsome 2-color, 20-pager has sections on two versatile suspension methods. Explains how to install lighting systems along with sprinkler, air conditioning, telephone, electrical, plumbing systems. Many photos. *Sylvania Electric Products, Inc.*

54—Fractional-Hp. Motors. Featured in this 10-page brochure (1-1P1) are 48- and 56-frame, 1/20- to 1-hp. units, open and closed

In a Mess?

CALL "ELL" AND "ESS"!

The best laid new product plans sometimes bog down because of fastening problems.

On paper the product looks good—*is* good . . . is designed in every way for efficiency and salability.

But putting it together may be another story. Special type bolts or nuts may be required to do the job right.

Whenever a "crisis" like this turns up, call in "ELL" & "ESS", the helpful Lamson & Sessions "can do" pair. They can engineer the required fastener, they can make it and many times they save you money.

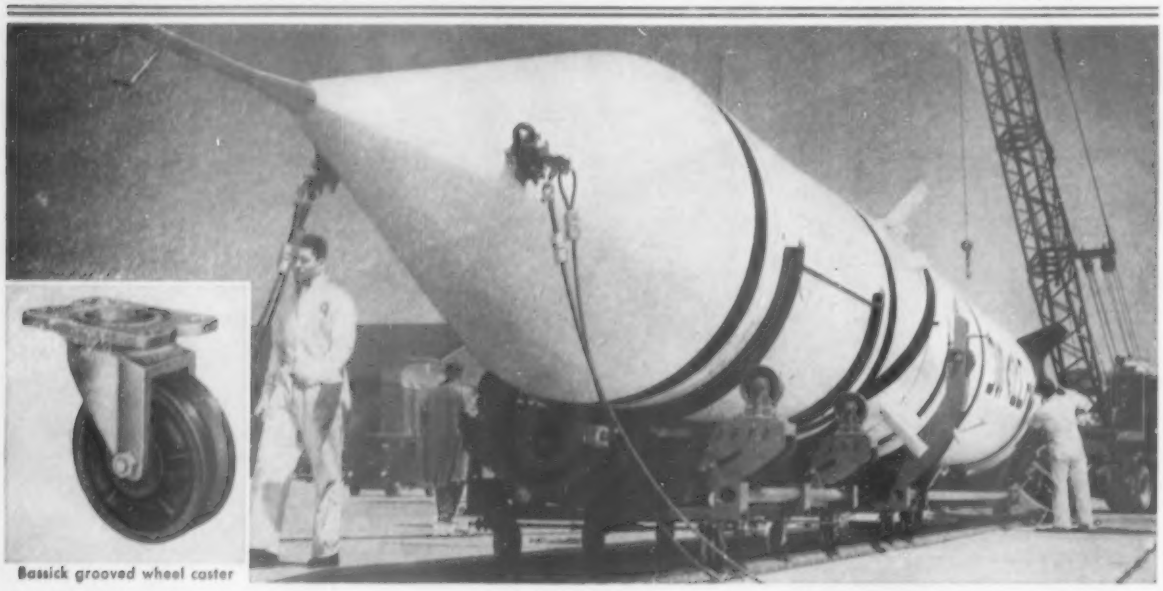
The LAMSON & SESSIONS Co.

1971 West 85th Street · Cleveland 2, Ohio

PLANTS AT CLEVELAND AND KENT, OHIO · BIRMINGHAM · CHICAGO

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★



Bassick grooved wheel caster

Long range missile on Bassick casters

Photographed at the recent Armed Forces Day, the prototype Redstone Army missile gets special handling.

That's why on both top and bottom of the missile stand you see Bassick grooved wheel casters. On inverted-angle iron tracks, they provide absolute control and smooth, safe rolling. The grooved wheel casters on top of the stand are used to rotate the missile to make various instrument ports and panels more accessible.

Note, also, that the stand has movable caster mountings so that the wheels can always be positioned under the missile's center of gravity (which changes during production and as fuel is added). The Army's Redstone is expected to operate at ranges up to 1500 miles.

Fork Lift Truck rides Floating-Hubs

The 3000 lb. capacity Raymond Reach Fork, "the truck with the boarding house reach," operates in narrow six-foot aisles on Bassick Floating-Hub casters. This is rugged duty for any caster, and calls for constant swivelling under power and over all types of floor conditions. Because the Bassick Floating-Hub casters give long life and a stable ride, The Raymond Corporation is very satisfied with them.

THE BASSICK COMPANY Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

Sweet's

Bassick

A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS MAKING CASTERS DO MORE

Shakespeare on casters

The big stage at the American Shakespeare Theatre, Stratford, Conn., (that's a scene from King John, above) can be moved out of the way for local benefits and community projects. The entire stage moves easily on 44 Bassick Casters.

This unusual job is just one of the many new caster applications turning up today. Some of them might pay off in your business; talk to your industrial distributor.

Rol-Rack on Bassicks

That's the name of this rolling book case that's going places on rubber-tired Bassick casters. It's only one of hundreds of racks and furniture that are easier to use (easier on floors, too) with Bassick casters. Maybe some of your plant equipment could do a better job on casters.

Ask your Bassick Distributor

If you let him in on your problems, you'll find his broad experience a big help in working out solutions. And his product knowledge can often save you money, too. Always ask him to recommend which Bassick caster can best handle a specific job. 6.7

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types. Includes examples of mechanical variations; chart on electrical characteristics; ratings and dimensions. *Century Electric Co.*

55—Rectifiers & Transformers. Two bulletins: GEA-6545 (12 pages) gives features, applications, specs on ¾- to 125-kw. selenium rectifiers. GEA-5754C (16 pages) does same for 15,- to 10,000-va. voltage-stabilizing transformers; performance graphs. *General Electric Co.*

56—Batteries. Folder 5916 illustrates positive-plate design of line of batteries for stationary power services. Shows how special feature (spiral buttons) provides a reserve supply of lead and a large effective working area. 6 pages. *The Electric Storage Battery Co.*

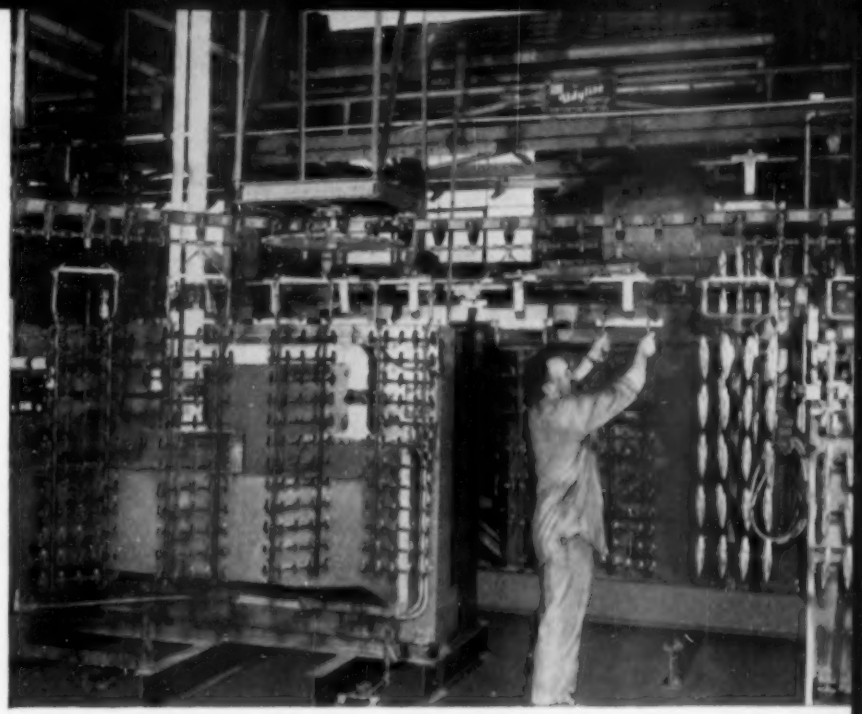
57—Plastic-Coated Raceways. Installation guide (No. 18-166) contains step-by-step illustrated installation details for obtaining maximum protection and efficiency from plastic-coated rigid steel conduit and electrical metallic tubing. 14 pages. *General Electric Co.*

PRODUCTION

58—Tool Steel. Fourth edition of "Tool Steel Handbook" contains a crammed 204 pages on types, properties, applications. Chapters on selecting the proper steel; tool steel products, and working tool and high speed steels. Reference tables. *Allegheny Ludlum Steel Corp.*

59—Flammable Liquids. Their nature, safe handling, and use in modern production procedures is explained in first three sections of a continuing series, now available in loose-leaf binder. All interested will be listed to receive future issues. *The Protectoseal Co.*

60—Platecoil. How to cut heat-transfer costs in many industrial applications is subject of Bulletin IP-356 (8 pages). 14 problem-solving installations are diagrammed; specs



QUALITY IMPROVED—PRODUCTION INCREASED WITH UDYLITE PROCESSES AND EQUIPMENT

In the manufacture of rear view automobile mirrors by Yankee Metal Products Corporation of Norwalk, Connecticut, a variety of die cast parts are used. All of these die cast parts are copper, nickel and chrome plated on the Udylite Full Automatic Plating Machine. Shape and sizes of these parts vary considerably.

The Udylite Full Automatic handles the complete processing of the parts from the bare die castings to a finish ready for final assembly. Its operation has provided perfect precision, a doubled capacity and a minimum of rejects.

Udylite Bright Nickel has played an important part in the perfect coverage of these die castings. With the chrome overlay, Udylite Bright Nickel has provided not only the glistening finish demanded for this luxurious line, but also the guaranteed protection for these accessories which are constantly subjected to attack by the elements.

Hand in hand, Udylite equipment and processes are solving many plating problems. Providing sales appeal finishes—plated protection—multiplied production. Find out how you can use these same advantages.

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☐ Water ☐ Fumes
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☑ faster

INDUSTRY is finding hundreds of applications for CARLON plastic pipe. Carlon offers the largest, most complete line of plastic pipe made today . . . you are sure to find a type and size of Carlon pipe to meet your requirements.

Carlon's smooth inner walls resist build-up of solids, assure a constant maximum flow. It has high resistance to a wide range of corrosive chemicals. Carlon pipe and tubing can easily be connected satisfactorily to metal. So tell us your requirements and we will suggest a pipe to solve whatever piping problems you may have.

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FACTORY / CATALOG NEWS
Begins on page 158

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and dimensions listed for all 4 styles of platecoil available. *Tranter Mfg., Inc., Platecoil Div.*

61—Spray Lubrication Systems. Bulletin No. 60-A provides detailed info on systems for open gearing and slide surfaces. This 8-page, 3-color booklet has schematic layouts, application views of manual and automatic systems and component equipment. *The Farval Corp.*

62—Pressure Feed Tanks. Units for use in all types of automatic, stationary, or portable paint-spray systems are described and illustrated in Catalog 9. This 16-page, 2-color booklet lists ASME Series 91 and 92 models; complete accessories. *Paasche Airbrush Co.*

63—X-Ray Unit. "X-Ray Diffraction for Research, Production Control . . . and Profit" is the title of this 4-pager. Discusses basic theory, definitions, applications in metallurgy, chemistry, etc.; typical patterns of crystal study. 2 units shown. *General Electric Co.*

64—Compacting Presses. Comprehensive Catalog No. 816 includes models ranging from simple hand-operated machines of 1½-ton capacity to fully automatic 300-ton hydraulic presses. Contains 24 pages of photos and data; table of specs for all models. *F. J. Stokes Corp.*

65—Hydraulic Feed Units. A descriptive bulletin, specification sheet, and price list cover new line of standard horizontal and vertical way type hydraulic feed units. Contain data on components for build-your-own production machines. *The Hartford Special Machinery Co.*

66—Finishing Brushes. Shows how to get double duty from centerless grinders by using them for precision brush finishing of cylindrical parts. 4-page brochure contains installation photos and brush specifications; also set-up instructions. *The Osborn Mfg. Co.*

Turn to page 298

Another plant
BOOSTS
maintenance efficiency with
KALAMAZOO SPEED TRUCKS

MODEL 2500 LW gas-powered

GOODYEAR TIRE AND RUBBER COMPANY EFFECTS SUBSTANTIAL SAVINGS

You'll want the full story about how Kalamazoo gas-powered Speed Trucks have increased maintenance efficiency and cut costs for Goodyear—as they can for you.

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- Revolving Bins
- Filing Cabinets
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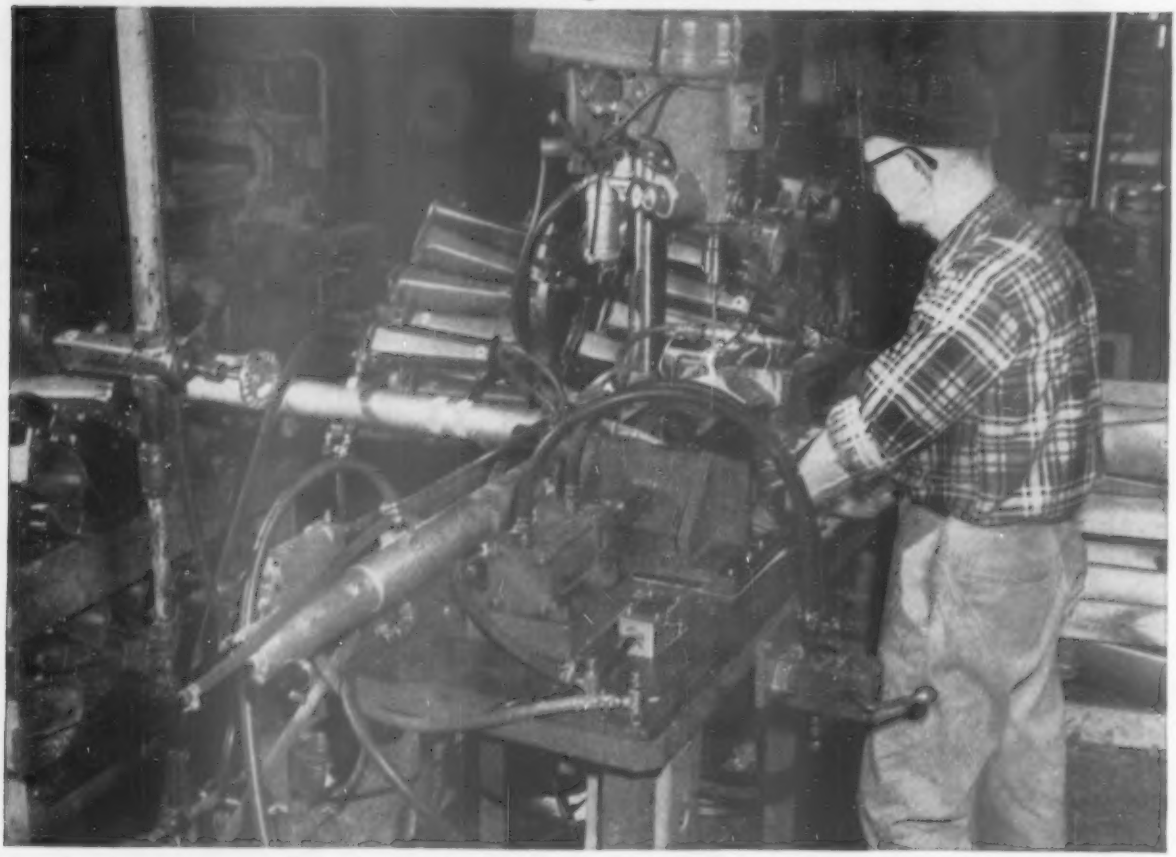
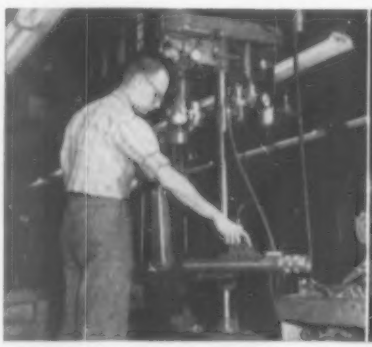


At this drill press station, four Keller Tool "Airfeedrills," with five-, six- and eight-inch strokes, drill four extra holes in the workpiece as the drill press finishes one hole from above.

Drills 4 extra holes . . . production time: zero!

Production men have found a new and ingenious way to complete drilling operations with no extra production time. When a workpiece has to be jigged or put in a drill press for some operation, they mount Keller Tool "Airfeedrills"® in position to perform additional drilling, reaming, tapping or facing operations at the same time. The illustrations on this page show how it's done.

Ideal for mounting in multiple units or as single outriggers, Keller Tool "Airfeedrills" and "Airfeedtappers"® perform complete work cycles automatically—at the press of a button. Further details are available in Bulletin 92.



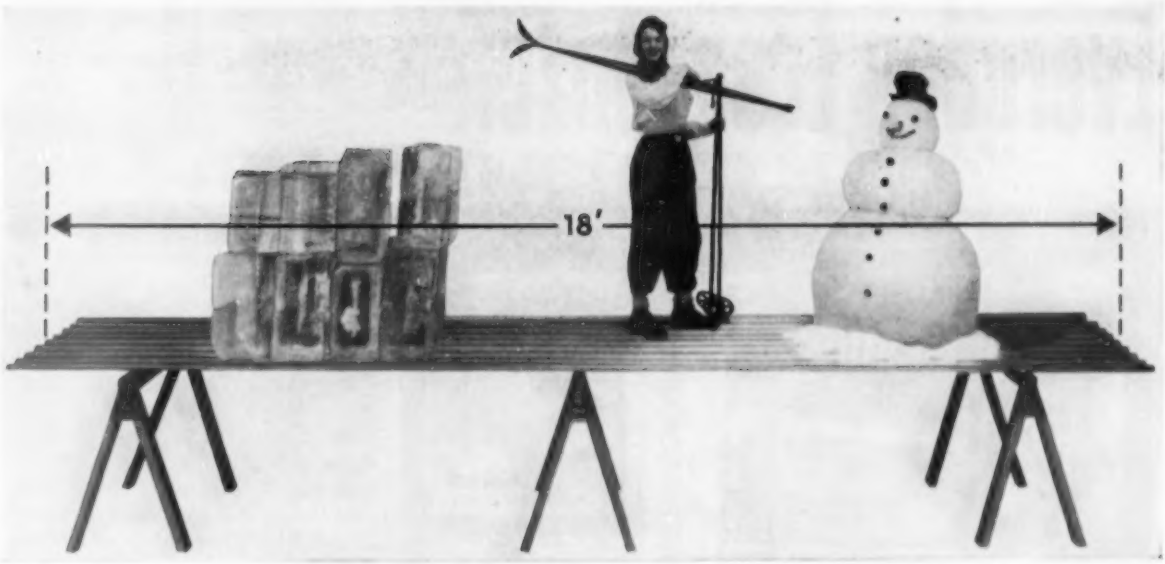
Operator presses a button—and the Keller Tool "Airfeedtapper" provides a free tapped hole while standard machine taps three holes at top of piece.

While special multiple head unit drills eight holes in the work, an "Airfeedrill" mounted at rear of fixture step drills a "free" ¼-⅜-inch hole at an odd angle.

GARDNER - DENVER

KELLER TOOL division, Grand Haven, Michigan

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY



Light aluminum overcoat for industrial buildings . . . laughs at weather . . . jeers at high costs

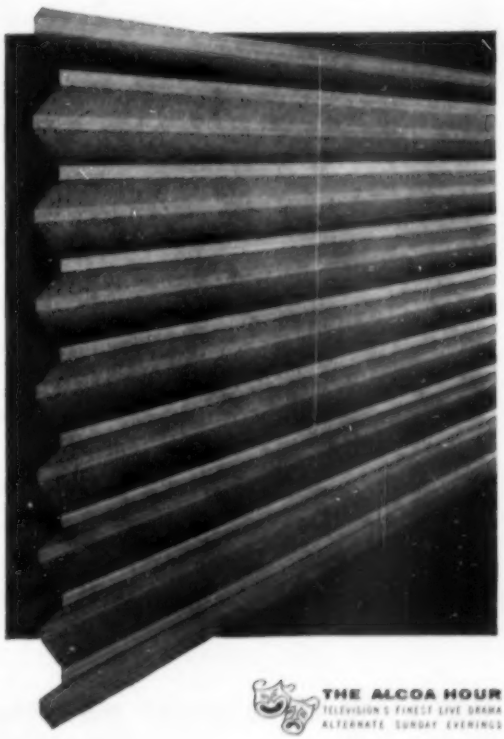
The sides and roof of your building may never have to support 1,200 pounds of ice, a five-foot snowman and a pretty girl in an area of 61½ square feet. But that will give you some idea as to the remarkable load-bearing capacity of Alcoa's exclusive new Aluminum V-Beam Industrial Roofing and Siding.

This unusual strength of Alcoa® V-Beam, plus its 18-foot length, means major savings in industrial construction. Why? Because less structural steel is needed. Because erection is faster. Because fewer of these bigger sheets are needed. Because there is less waste in side and end laps.

Warehouses, factories, storage sheds . . . any buildings . . . can be roofed or sided for as little as 65 cents a square foot . . . and with all of the long-term advantages only aluminum offers.

You get lower maintenance costs . . . so low they almost vanish! No painting. No rotting. No red rusting. No damage from salt air, industrial fumes or other harmful conditions. Twenty-five years of application in industrial areas proves this.

When new plant recommendations are called for, make certain that use of Alcoa's new 18-foot V-Beam sheet has been investigated. Aluminum Company of America, 862-L Alcoa Building, Pittsburgh 19, Pennsylvania.



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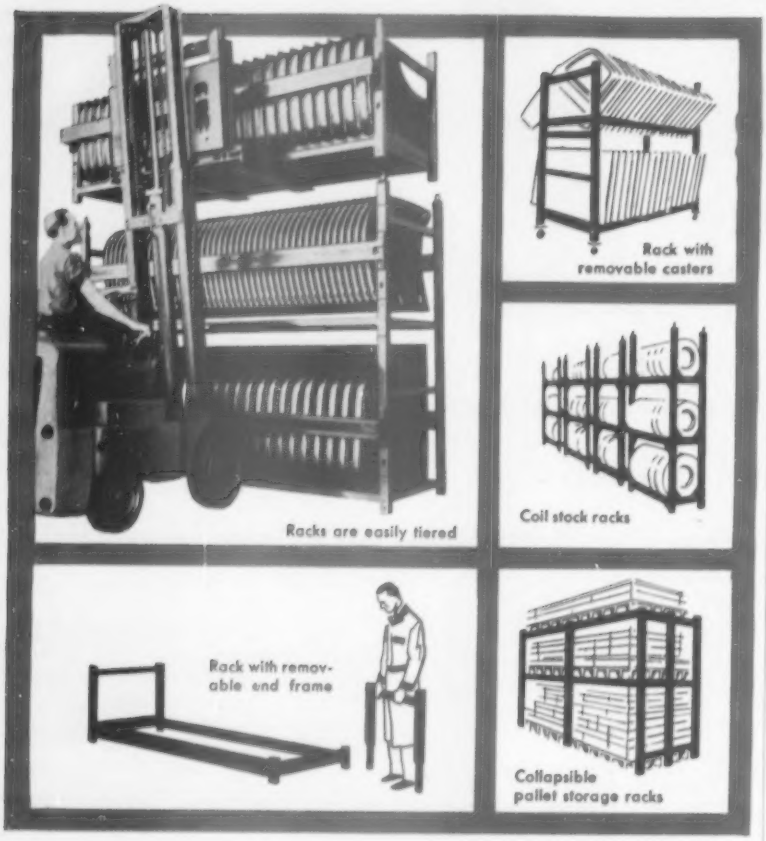
ALCOA ALUMINUM BUILDING SHEET

Everyday Economizers-

MHS CUSTOM-TAILORED RACKS


Racks are easily tiered
Rack with removable casters
Coil stock racks
Rack with removable end frame
Collapsible pallet storage racks

There's nothing spectacular about racks—*except the economies they can effect in everyday operation!*

MHS racks, engineered to your particular use, organize and simplify handling of parts and components, minimize damage in transport and storage, make labor more productive, increase storage capacity of your present areas, improve housekeeping, promote safety.

MHS custom-tailored racks can be built to handle pallets or any material or component, large or small, light or heavy. These racks stack safely and easily, tiered as high as space permits. The racks may be fixed, portable, caster-mounted or collapsible.

For day-in, day-out space, labor and time economies, freedom from damaged materials and improved general efficiency, investigate low-cost MHS racks. Write or call today!

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FACTORY / CATALOG NEWS
Begins on page 158

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

67—Plastic Tooling. Here's an 8-page digest that summarizes successful practices of tool and die shops and other users of plastic materials for metal- and plastics-forming applications. Sections on plastic tooling, materials, curing methods and hardeners, and resin selection. *Marblette Corp.*

68—Lathes. Heavy-duty 16-in. engine and plain bed gap lathes are subject of 10-page illustrated booklet (HD-127). Details on new headstock and high-speed spindle mounting; combination gear-belt drive, quick-change box, other features. *R. K. LeBlond Machine Tool Co.*

FASTENINGS

69—Grooved Fasteners. All about different types of pins that have parallel, equally spaced grooves impressed longitudinally on their exterior surface; also sections on studs, dowels. This 24-page catalog includes typical applications and specifications. *Driv-Lok Pin Co.*

70—Tools. Power and hand tools for special fastening jobs are subject of Bulletin F6156. Covers power drills and nut runners for attaching covering to heavy steel members, and for fastening sheets to light-gage members; bits and accessories. *Fabricated Products Co., Inc.*

71—Studs. Type CP threaded studs, available in ¼- to ⅝-in. diameters, are treated in this 8-page brochure. Tables show stud specifications and prices; also data on accessories for welding CP studs—ferrules, chuck, ferrule holder. *Nelson Stud Welding Div. Gregory Industries, Inc.*

72—Lockwasher. Four-page pamphlet describes spring steel lockwasher that features a tight vibration-dampening grip on the screw, plus positive locking action. Gives information on new washer that is formed from flat strip stock. *American Stamped Fastener Co.*

Turn the page

FIRE!

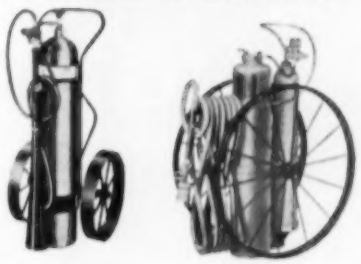
HOW TO DETECT AND EXTINGUISH IT IN SECONDS!

HAND PORTABLES

Carbon Dioxide | Foam Soda-Acid Clear Water Anti-Freeze | Pressurized Water Anti-Freeze | Dry Chemical

Kidde CO_2 Portables, either trigger-release type or squeeze-type valve models, are available in sizes from 2½ to 20-pound capacities. New Kidde Wet Chemical extinguishers are available in 2½ gallon bronze or stainless steel models, including pressurized Water or Water-Anti-Freeze Unit (illustrated). Kidde Dry Chemical Extinguishers are available in cartridge-operated models of 20 and 30 pounds capacity or pressurized models of 5 and 10 pounds capacity.

MOBILE EQUIPMENT

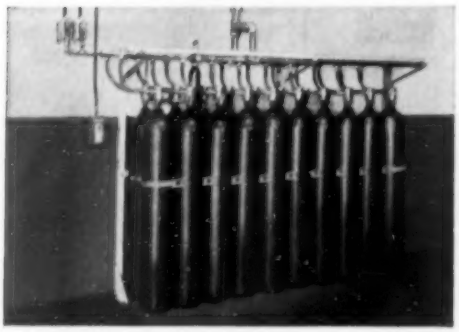


50, 75 and 100 lb. CO_2 Units | 150 lb. Dry Chemical Unit

For major fire hazards, get a mobile unit. Wheeled CO_2 units are available in 50, 75 and 100 pound capacities, in one cylinder.

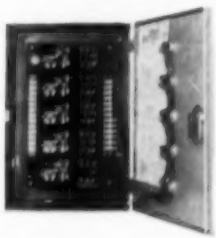
150 pound dry-chemical unit has straight stream for long range . . . fan pattern for wide coverage. Both units give expert results even with inexperienced operator.

CO_2 SYSTEMS



New Kidde pressure-operated CO_2 extinguishing systems are individually designed to fully protect even the most dangerous hazards, use no falling weights or clumsy mechanical triggering methods. Pneumatic Control Heads insure instant and complete CO_2 discharge. Directional Valves afford protection to more than one hazard using the same bank of CO_2 cylinders.

ATMO DETECTING SYSTEMS



Kidde ATMO is a wide-area automatic fire detecting and warning system which works on the principle of rate-of-temperature-rise. It is ideally suited for cases where life protection is of vital importance, or where quick, early detection of fire in valuable materials is essential.

The very first hot breath of fire triggers the ATMO system, and sounds the alarm. In addition, the system can also close doors, shut off fans or blowers—all *automatically*.

What's more, the Kidde ATMO system operates independently of regular power sources, will still give protection even if outside power fails.

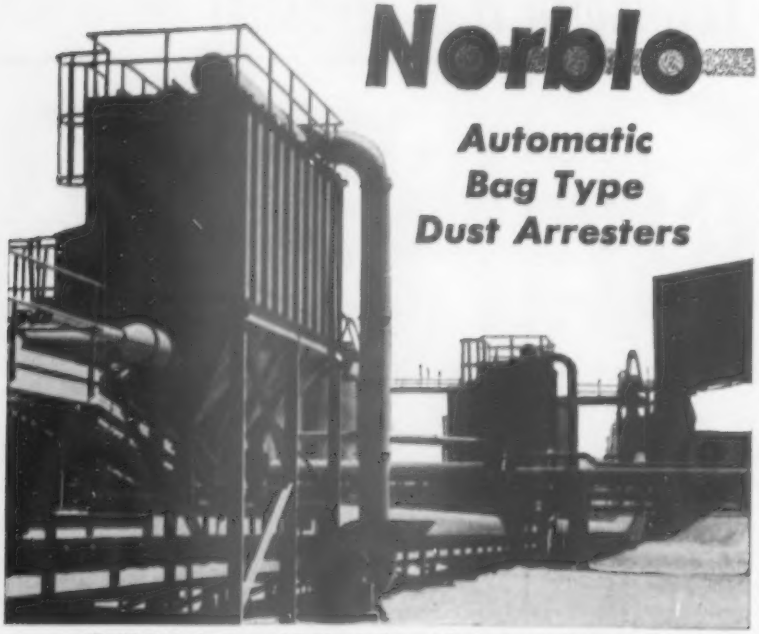
Kidde (K Kidde)

Walter Kidde & Company, Inc., 1132 Main Street, Belleville 9, N. J.
Walter Kidde Company of Canada, Ltd., Montreal—Toronto

Full dust collecting capacity always available from

Norblo

Automatic Bag Type Dust Arresters

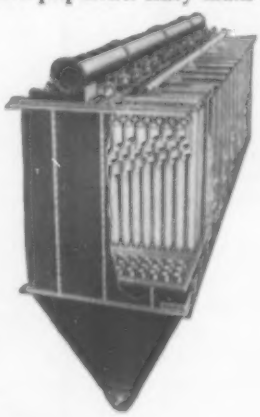


Norblo Dust Arresters at California Cement Corp. plant at Mojave, Cal.

Twenty-four hours a day is a gruelling grind, but Norblo equipment takes it. What's important to plant owners and operating staff is that full dust collecting efficiency holds level during the day and night punishment.

Norblo installations include a group of basic compartment units, each housing 78 cylindrical bags. Variable cyclic cleaning involves one compartment at a time, and that for only a few seconds. Engineered to the needs of each installation, there's ample capacity without waste, but without undue strain on the equipment. Easy maintenance is provided for.

Users of Norblo Equipment in cement plants, industrial plants of many types, and mining and smelting agree that complete satisfaction is assured when you install Norblo. Write for information—state your dust collection problem.



Norblo also builds centrifugal and hydraulic dust collectors, exhaust fans, cement air cooling systems, and portable type dust collectors.

The Northern Blower Company

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Norblo ENGINEERED DUST COLLECTION SYSTEMS FOR ALL INDUSTRIES

FACTORY / CATALOG NEWS
Begins on page 158

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MISCELLANEOUS

73—Rescue Equipment. Complete line of hydraulically operated rescue equipment used to release victims trapped in wrecked vehicles, under debris, or in burning buildings is described in 12-page manual HR-300. Includes action photos of rescue crews applying Porto-Power kits. *Blackhawk Mfg. Co.*

74—Magnets. Color Catalog No. 156 (16 pages) contains data, photos, dimension drawings and charts on various industrial magnets—plates, sweepers, separators, drums and pulleys, grids, troughs and filters; also special units. Handily indexed by types. *Magni-Power Co.*

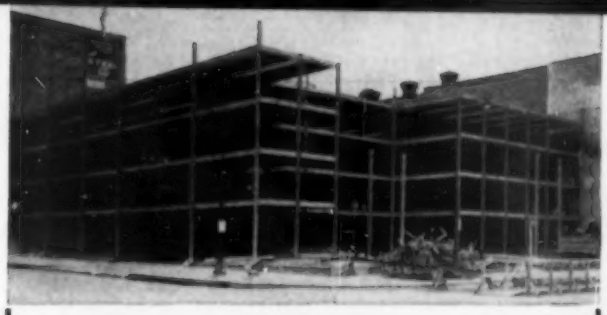
75—Checks & Tags. This thick, spiral-bound catalog is a combination of illustrative, descriptive, and technical data on metal checks, tags, plates, signs (shown in color), badges, and similar products for identifying items of all kinds. *Jas. H. Matthews & Co.*

76—Compressors, Engines, Turbines. Here are two handsomely illustrated bulletins: No. 131 (26 pages) on units for petroleum, gas, chemical, marine, and general industrial applications; and No. 142 (28 pages) on the Mark TA, a compact 1130-Bhp. gas turbine for wide industrial use. *Clark Bros. Co.*

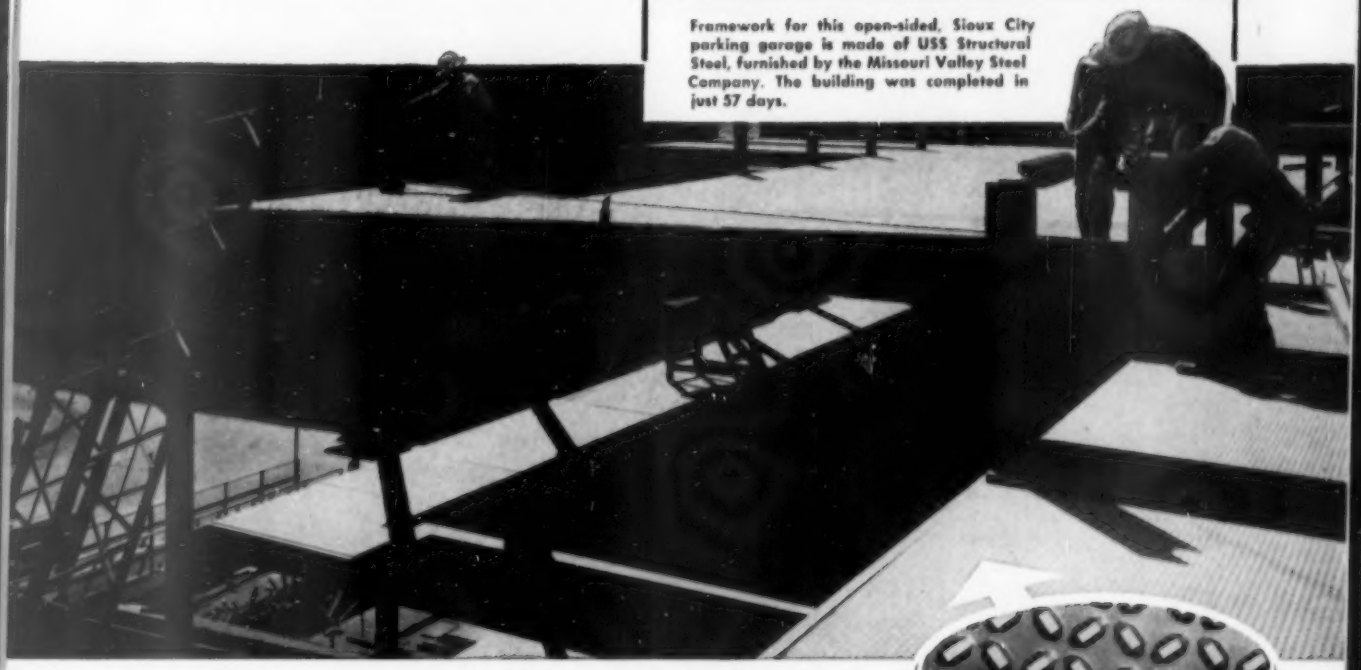
77—Industrial Seating. Production chairs (fixed height and swivel models) and how to sit on them are treated in detail in this 24-pager, perforated for looseleaf binding. There's also a section on planned storage units, with construction features. *Royal Metal Mfg. Co.*

78—High-Speed Movies. Five illustrated case histories show how major firms have used advances in film sensitivity to extend scope of high-speed movies to solve engineering problems. 12 pages of facts on types of film, light, speed selection, lenses, other useful data. *Eastman Kodak Co.*

Sioux City cars park on 223 tons of *Multigrip* Floor Plate



Framework for this open-sided, Sioux City parking garage is made of USS Structural Steel, furnished by the Missouri Valley Steel Company. The building was completed in just 57 days.



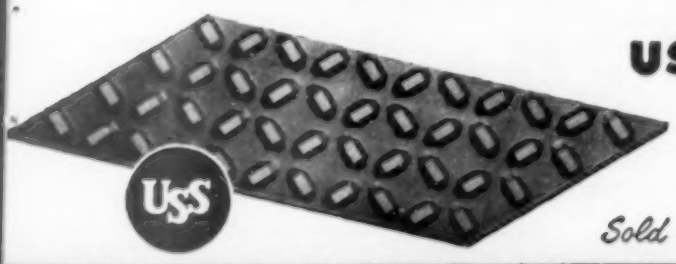
A section of reinforced USS Mutigrip Floor Plate (long enough for two cars) is swung into place in this Sioux City Parking Garage. Multigrip's evenly-spaced, flat-topped risers will give non-slip traction plus long-lasting service. Because of the garage's virtually all steel, open-sided construction, expansion will be greatly simplified.

Just 57 days after delivery of materials, Sioux City drivers were parking in this four-story Sioux City Parking Garage. The open-sided garage isn't complicated—but it's there to stay. Structural framework consists of rugged USS Structural Steel while the flooring is USS Multigrip Floor Plate.

There were three very good reasons for choosing Multigrip as flooring. Flat-topped, evenly-spaced risers offer non-slip traction for feet and wheels, even when the plates are wet. By attaching Multigrip to steel flooring supports, whole sections of floor could be swung into place by a crane with a minimum of trouble and preparation. And, should it become necessary to expand this garage, there will be no need for expensive alterations or redesigning. It will be as simple as erecting more framework, attaching additional Multigrip to supporting beams, and swinging another section of parking space into service.

USS Multigrip is ideal for use where floors take a severe beating or where slipping accidents must be avoided. These rugged steel plates won't chip, crack or splinter. Evenly-spaced risers offer positive traction and easy cleaning as well as drainage in *all* directions. Multigrip can be formed or bent where necessary and is available in large plates, minimizing installation waste. Where wearability and safety are important—always specify USS Multigrip Floor Plate.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



USS multigrip FLOOR PLATE

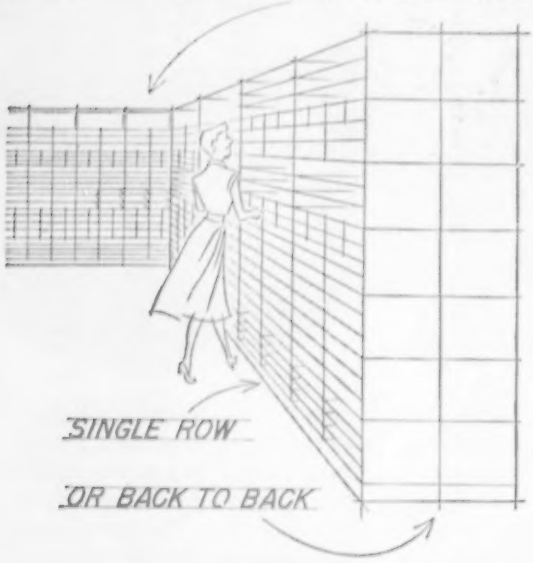
Sold by leading distributors from coast to coast

UNITED STATES STEEL

HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE

STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT

USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

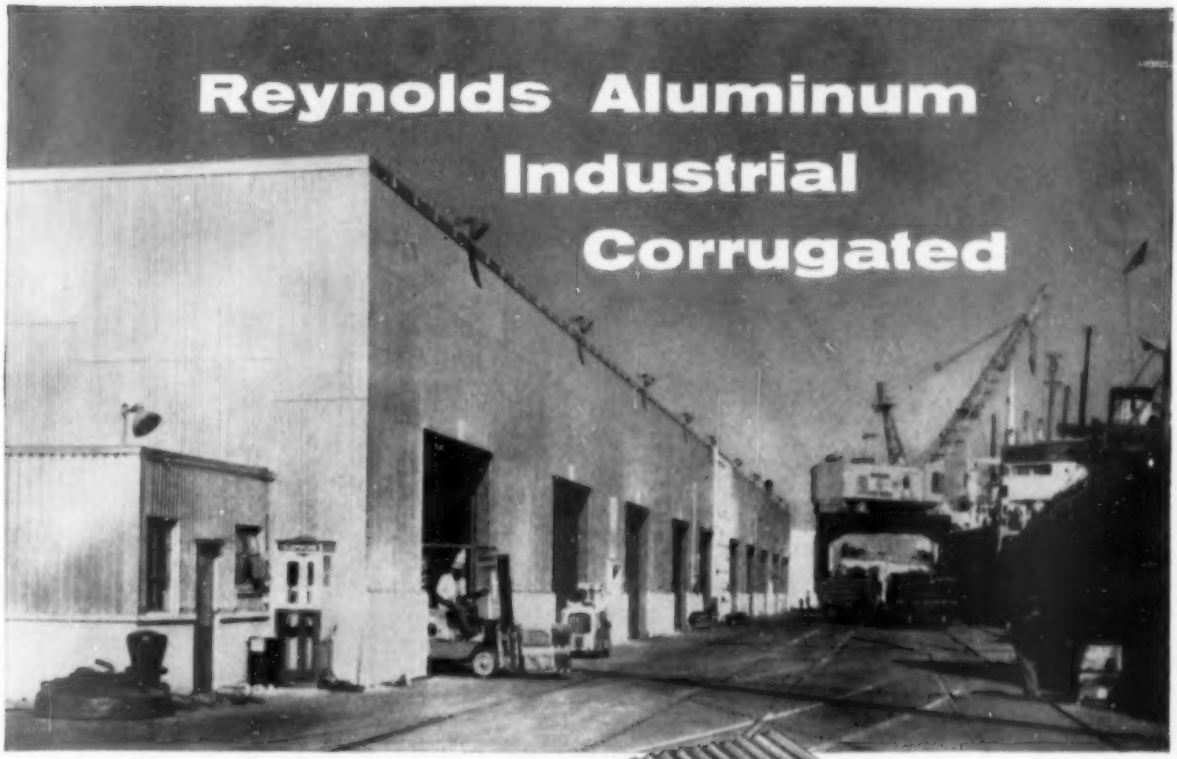
SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked-on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2110 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 11, Pa.

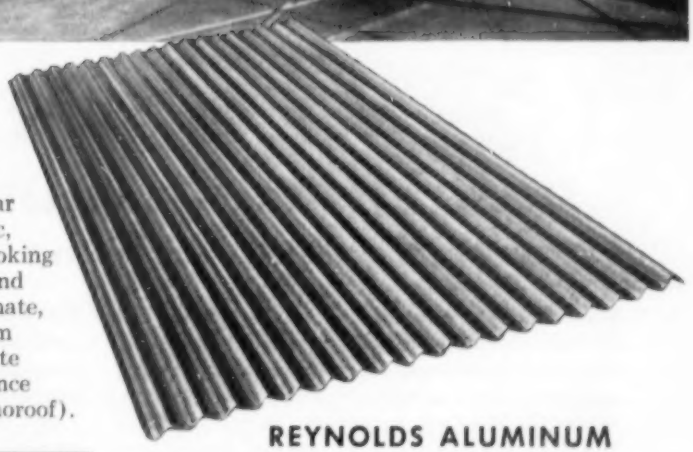
HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN PENNSYLVANIA

BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

3-Year-Old Installation Speaks for Itself!



The Georgia Ports Authority, operating Savannah State Docks and Warehouses, is responsible for the 1953 installation of Reynolds .032" Industrial Corrugated on transit sheds like the one shown above. Not far from the ocean and in the smoke of river traffic, this siding has remained clean, bright, new-looking ... telling its own story of freedom from rust and resistance to corrosion. In this Southern climate, the high radiant heat reflectivity of aluminum (up to 95%) is an important advantage. Write for literature on this long-life, low-maintenance material...also widely used as roofing (Reynoroof).



REYNOLDS ALUMINUM INDUSTRIAL CORRUGATED

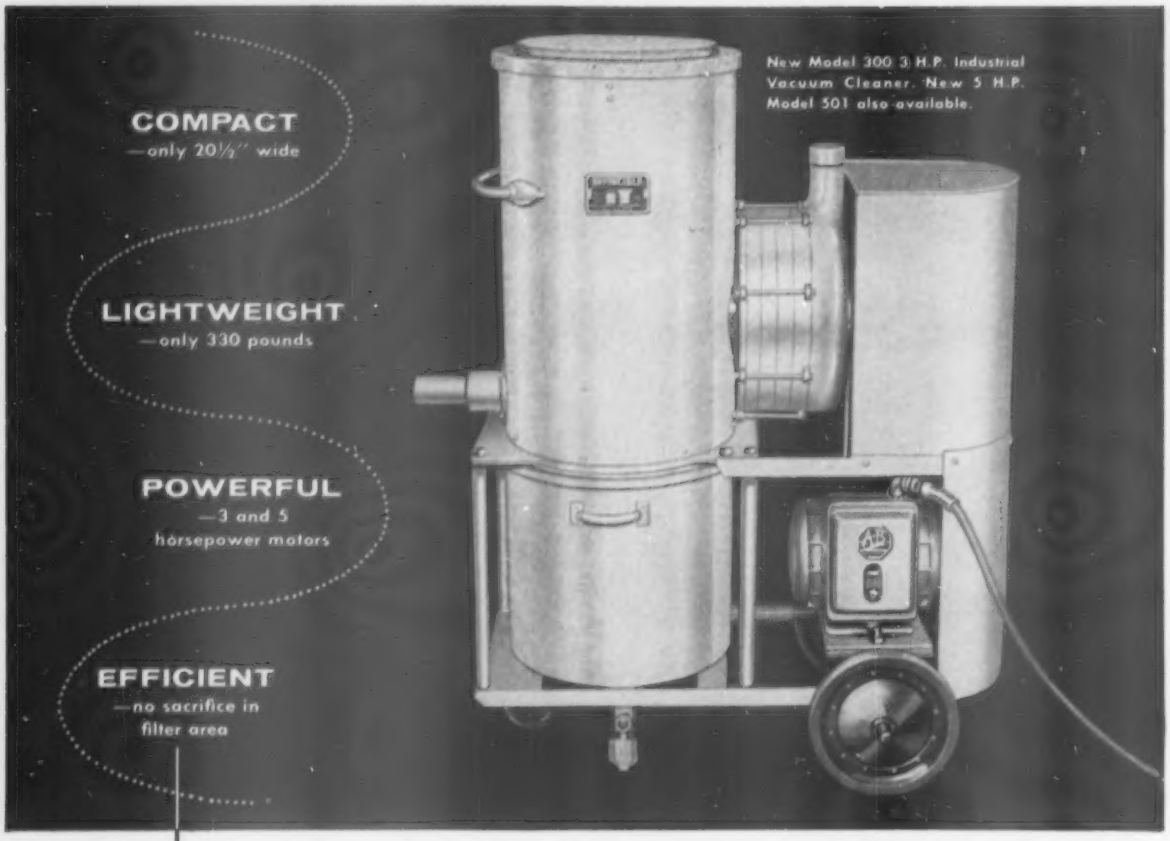
Specifications:

Thickness: .032"
Widths: 48½" and 35"; nominal coverage 45" and 32"
Finishes: Embossed or mill finish.
Corrugation: 2.67" center to center; ⅞" depth.
Weight: 56 lbs. per 100 sq. ft. of formed sheet.

A complete installation service is available. For name of nearest franchised jobber-erector, call the Reynolds office listed under "Building Materials" in classified phone books of principal cities. Or write to **Reynolds Metals Company,** Building Products Division, 2007 S. Ninth St., Louisville 1, Kentucky.

REYNOLDS ALUMINUM
BUILDING PRODUCTS

See "CIRCUS BOY," Reynolds new dramatic series, Sundays, NBC-TV Network



2 NEW INVINCIBLE
Industrial Vacuum Cleaners
For Heavy-Duty Cleaning in Close Quarters

These rugged, versatile Invincible Models are designed for use in highly congested areas and to meet specific requirements created by modern production methods and present day maintenance standards. They are engineered to reduce costs and increase efficiency on special production problems and intermediate applications that cannot be handled by undersize machines or economically by bulky, oversize equipment.

COMPACT—AND EFFICIENT. Even though these Invincibles are amazingly compact, filter area has not been sacrificed.

PORTABLE. Mounted on a swivel wheel carriage only 20½" wide and weighing less than 330 pounds, they follow the operator with a slight tug on the hose through narrow aisles and over rough floors.

VERSATILE. Designed for rough, heavy-duty service and continuous operation, they recover, reclaim and convey virtually any material: metallic litter, liquids, fabricated parts, dirt, dust, etc., etc.

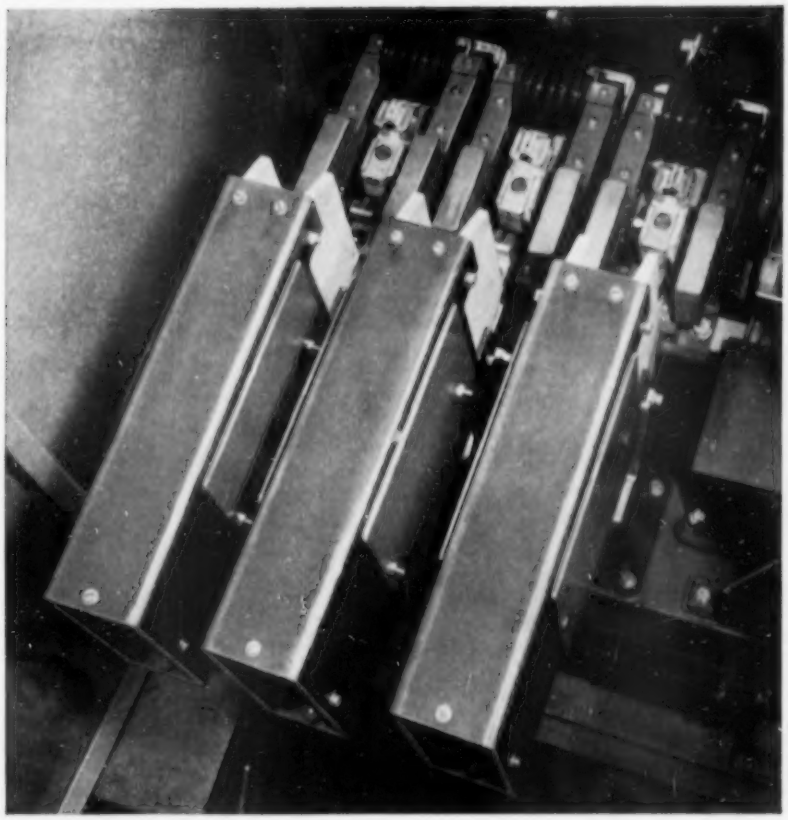
TROUBLE-FREE. Even highly abrasive litter is safely handled; no recovered material comes in contact with moving parts.

WRITE TODAY *for full details on new Invincible Models 300 (3 H.P.) and 501 (5 H.P.)*

INVINCIBLE

VACUUM CLEANER MFG. CO.
DOVER, OHIO
OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

New high-voltage contactors bring your maintenance costs way down.
Tilt-out arc chute design gives instantaneous accessibility to contacts for inspection or easy replacement.



Now! Unmatched arc quenching action with Westinghouse High-Voltage Starters!

A. STANDARD UNIT . . . Synchronous motor starter, 60" deep with air-break contactor.

B. SHALLOW-DEPTH UNIT . . . Typical induction motor starter, supplementing standard line. Only 30" deep, with air-break contactor.

Now! Westinghouse high-voltage starters offer you more efficient operation and lower maintenance costs. Sets of powerful dual-blowout coils get arcs off the solid copper contacts and into the arc box immediately. There they are split, stretched and cooled between refractory plates of moisture- and flame-resistant zircon, *giving unmatched arc quenching action.* This means longer life for arc chutes and contacts and brings your maintenance costs way down.

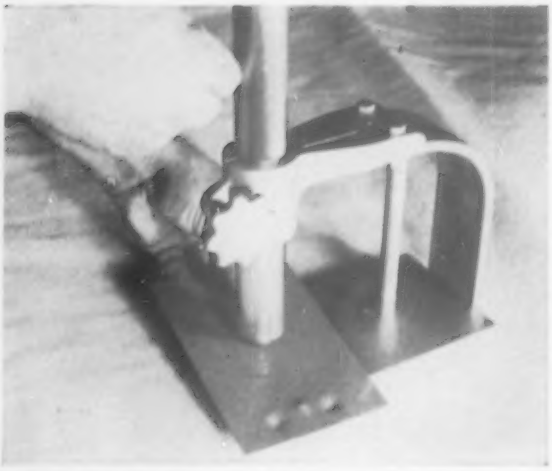
In addition, regular contact inspections can be made quickly and easily. Just tilt out the arc chutes on a Westinghouse contactor — all essential parts are immediately exposed for examination. Nonrusting bronze holding bolts with standard bolt heads can be quickly removed without the use of special tools. Contacts can be replaced in a matter of minutes.

These are but a few reasons why it will pay you to call your Westinghouse sales engineer and get the facts on industry's most advanced high-voltage starters. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa., and ask for Bulletin B-6535. J-21938-X

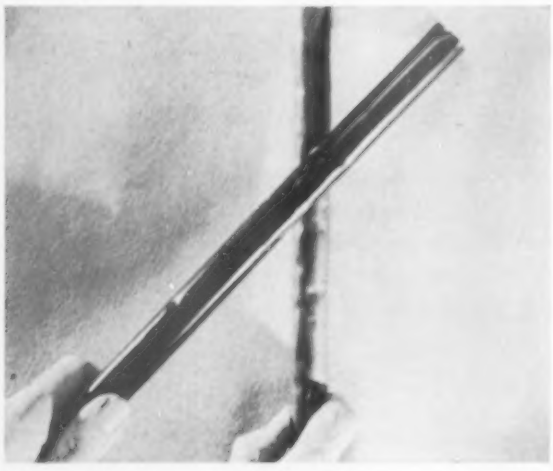
WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

For more about these products, circle item numbers on Reader Service Card next to back page.

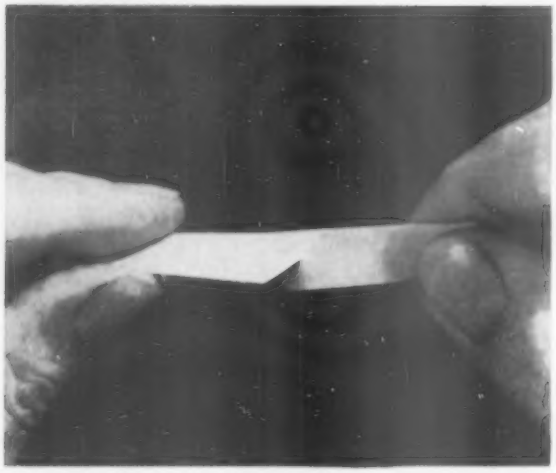


Denting won't damage it!



Banging won't chip it!

Bending won't crack it!



Twisting won't peel it!

Epoxy Resin Enamel is Tough, Low-Cost

New industrial finish adheres to glossy plastic—solves color problem for many manufacturers.

It's especially helpful to those making consumer items on which demand for color is increasing. Now thermosetting plastics (phenolics being the most common) and many metals can be color-finished permanently with a single coat.

This epoxy based finish is tough. Two steel bars coated with it won't chip when banged together. Also has excellent heat-, corrosion-, chemical-, and abrasion-resistance.

And cost is low—about a cent a square foot. Available in finishes from dead flat to high gloss in any color. Can be cured by air or force drying or baking.

Rexton Finishes, Inc. (Circle 1, Reader Service Card)

Turn the page

"We have no operating problems when we use STANOIL Industrial Oil"

Midwest Metal Stamping reports results of 8 years of press operation using STANOIL

Don Foster, Midwest Stamping Purchasing Agent and Jesse Nelson (right), Standard Oil industrial lubrication specialist, display metal blank and finished tub turned out on Bliss press. Technical service on lubrication problems is Jesse Nelson's job. He's been doing such work for seven years. Jesse has an engineering degree from the University of Iowa and is a graduate of the Standard Oil Sales Engineering School. Customers find this experience and training pay off for them.

In 1948, Midwest Metal Stamping Company, Kellogg, Iowa, put into service a Bliss Hydro Dynamic Press. STANOIL Industrial Oil was selected as the hydraulic medium. The initial fill was 1,400 gallons. The press operated continuously from 1948 until Christmas, 1954, when it was shut down five days for overhaul.

At the time of overhaul, the STANOIL Industrial Oil was drained. And here STANOIL'S superior demulsibility was demonstrated. Due to the high rate of condensation, two barrels of water were removed from oil reservoir. An oil analysis in the Standard Oil laboratory proved the oil still suitable for continued service. After filtration, it was returned to the reservoir and the press put back in operation. STANOIL continues to deliver the same perfect performance for Midwest as before.

STANOIL Industrial Oil can perform just as efficiently for you. Find out. There is a Standard Oil industrial lubrication specialist near you in any one of the Midwest and Rocky Mountain states. Call him. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

Stamping being removed from press by operator George Johnson. Press has used STANOIL Industrial Oil as hydraulic medium for eight years. Oil has perfect performance record.

STANDARD OIL COMPANY
(Indiana)

STANDARD

There's a lamp in the **amplex** line for... **High-Intensity, High-Bay Lighting**

THE AMPLEX MERCURY VAPOR LAMP assures excellent working-area illumination for the most exacting tasks, even when installed in very high bays. Your choice of 4 units, all 400W, all with a rated life of 6,000 hours; EH-1 Clear, 20,000 initial lumens; JH-1 Phosphor Coated, 18,000 lumens; and the lower-cost AH-1 and BH-1 Clear, 16,000 lumens.

There's a lamp in the amplex line, too, for every lighting need in your plant. Hi-Bay R57 and other Direct Reflectors with pure silver reflecting surface; Concentrators for high-intensity localized lighting; Indirects (bowl silvered) for drafting rooms; General-Purpose Incandescent and Fluorescent Lamps; Infra-Reds for industrial heating and baking;—your distributor carries them all.

Write for catalog on the complete amplex lighting line.

amplex Corporation
Dept. F11-56
111 Water Street
Brooklyn 1, N. Y.

For more about these products, circle item numbers on Reader Service card next to back cover.

2—Loctite, a chemical sealant, firmly secures threaded fasteners. As a liquid it looks like kerosene. Hardens automatically in joints between metal parts. Forms a heat- and oil-resistant pressure-tight plastic bond. *American Sealants Co.*

3—Anti-Spatter eliminates post-weld chipping and grinding operations. A silicone emulsion, it's applied to spatter area before welding starts. Forms a thin protective coat that prevents spatter from sticking to area around weld. Lets operator whisk spatter away with cloth—as shown in the photo above—or by air blast. *Linde Air Products Co.*

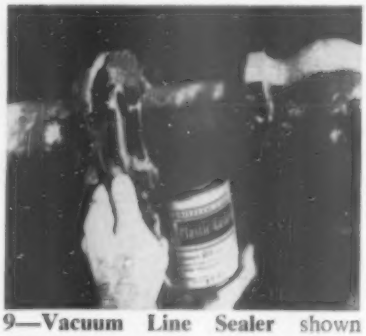
4—Spray-Booth Conditioner (No. 1160)—ideal for use with lacquers—conditions water, protects equipment, and helps reclaim paint. It's non-caustic, non-oily, and non-foaming. When applied, it surrounds paint particles causing them to float. "Captured" paint is then skimmed off surface for reclaim. *Klem Chemicals, Inc.*

5—Permagile joins concrete, brick, cement block, cinder block, tile, and other building materials with a strong bond. This poly-plastic alloy is waterproof, non-shrinking, and non-expanding. Unaffected by aging or atmospheric conditions. *Permagile Corp. of America.*

6—Non-Stretch Cotton Threads and yarns, impregnated with dextran and bonded with rubber or resinous materials, provide strength without stretch. Useful for power transmission belts and similar items where these qualities are of primary importance. *Commonwealth Engineering Co. of Ohio.*

7—No-Ox-Id Safeguard protects metal against corrosion. Water-based and non-flammable, it can be applied cold by dip or spray; forms a protective film. After a brief drying period, it will not wash off during outdoor exposure. *Dearborn Chemical Co.*

8—Hardsurfacing Flux called H-560. Used with mild steel electrode, this flux produces a weld that resists severe abrasion at temperatures up to 1100 deg. F. Also withstands medium impact. A mixture of fluxing materials and alloys, it adds alloys to the weld deposit. *Lincoln Electric Co.*

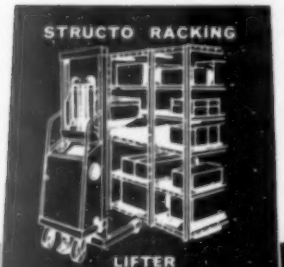


9—Vacuum Line Sealer shown above corrects minor leakage problems. No dismantling of flanges is necessary. Plastic-Gasket comes in two formulations. One is for air, steam, water, and mild chemical lines; the other for gasoline, oil, and solvent lines. *Flexrock Co.*

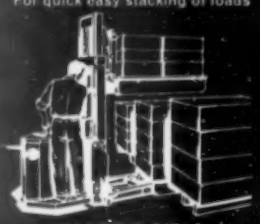
10—Silitex S. F. incorporates silicone in a cement basepaint powder. Mixture penetrates highly porous masonry to "breathe." Silicone does not interfere with hydration and setting of cement when compound is mixed with water for application. *Siliphane Corp. of America.*

11—Floor-Nu resists acids and alkalis that destroy mortar, wood, and concrete. This mastic can be used to completely resurface or patch existing floors and walls. It adheres to

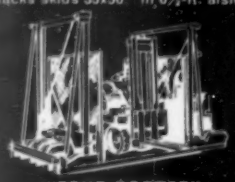
versatile COLSON LIFTABLE



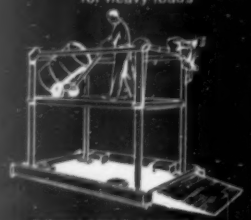
LIFTER FOR 500 TO 1000 LBS.
For quick easy stacking of loads



NARROW AISLE TIERING TRUCK
Stacks skids 35x50" in 6½-ft. aisle



"FOUR POSTER"
Electric Hydraulic lifter for heavy loads



PORTABLE LEVELER
For use in loading and unloading when dock is not available

speeds press or shear feeding...

FAST, SAFE, SURE handling of heavy sheets, plates and shapes is realized with Colson's electric hydraulic Liftable.

Now, material can be fed or extracted at bed level, without bending or hand lifting. Liftable eliminates waste motion and effort.

Operators respond to the ease and convenience of Liftable by increasing their rate of production.

Check these features:

- foot operated "deadman" up-down control
- four independent hydraulic rams with stabilizers assure level deck regardless of uneven loading
- one h.p. electric hydraulic power package; continuous duty, overload protected
- easily wheeled to new locations

10,000 lb. capacity • 36" x 78" deck
18" lowered height • 18" travel
36" x 93" overall width and length

EASY VERTICAL LIFTING

Colson®

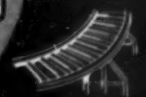
SMOOTH HORIZONTAL ROLLING

No. 6-807-195

No. 4-1037

No. 6-808-17

CASTERS


CONVEYOR
Aluminum or steel skate wheel or roller gravity conveyor

LIFT JACK TRUCK
No. 6712

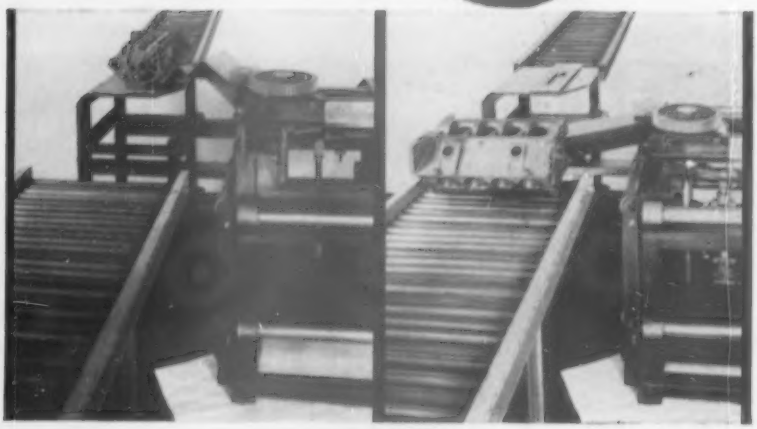
DRUM HANDLING TRUCK
No. 6055

IN LINE TRUCK
No. 7010

Write or phone for recommendation by specialists

The Colson Corporation • General Offices, **Elyria, Ohio**
Factories in Elyria, Boston, Toronto

One...



Two!

HERE'S A
DOUBLE-PLAY*
IN ECONOMICAL AUTOMATION!

Equipment for repositioning engine blocks in an automated sequence is just one example of Buschman creative engineering applied to automatic and semi-automatic production.

Modified and adapted at minimum cost, standard Buschman conveyor components . . . plus Buschman engineering "know-how" . . . solve such problems as automatic loading, unloading, transferring, sorting, dispatching and repositioning workpieces between production operations.

Whether your problem involves automation or dependable every day transportation, investigate the savings possible with Buschman. Remember . . . *when low-cost production is your goal . . . Buschman is your conveyor.* The E. W. Buschman Co., 4425 Clifton Avenue, Cincinnati 32, Ohio.

Write for literature.

* ANOTHER JOB-TAILORED APPLICATION OF **BUSCHMAN** STANDARDIZED CONVEYORS AND ENGINEERED TRANSFER EQUIPMENT

C-329-EWB

WORLD'S MOST COMPLETE LINE OF CONVEYING EQUIPMENT

BUSCHMAN
CONVEYORS

FACTORY / MATERIALS NEWS
Begins on page 306

For more about these products, circle item numbers on Reader Service card next to back page.

cement. And it can be applied without special tools. *Steelcote Manufacturing Co.*

12—Oakite Composition No. 117 removes grease, oil, and smut from machinery where water cannot be used. Also effective for cleaning electrical equipment. No rinse is necessary with this clear solvent detergent. Applied by brush, immersion, or non-atomizing spray. *Oakite Products, Inc.*

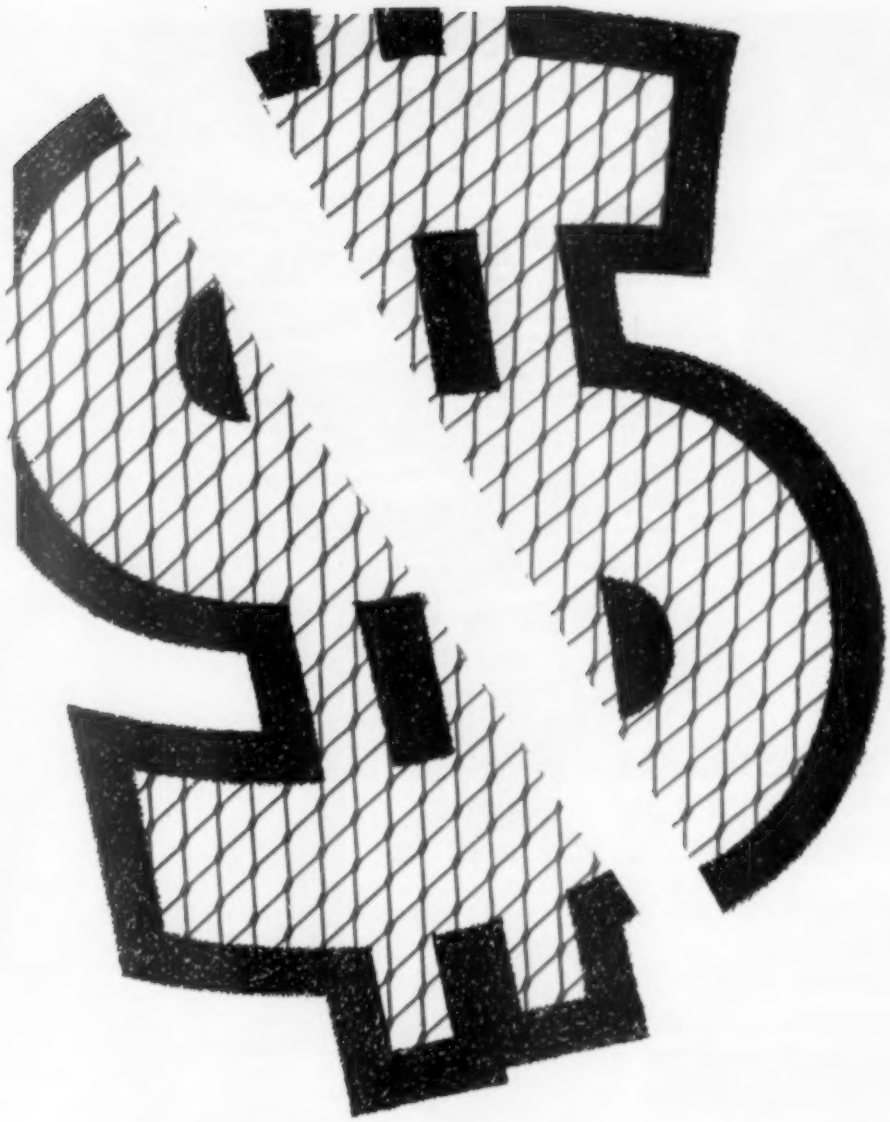
13—High-Heat Aluminum Paint withstands 1700 deg. F. temperatures without blistering or burning. C-I "Extra High" has a clear silicone base with pigment of special aluminum flake. Air-dries to a bright finish in approximately 30 minutes. *Chem Industrial Co.*

14—Agilene-F, expanded foam polyethylene, is now available in semi-molded components as shown here. Used for heat and electrical insulation, sound-proofing and similar applications. This lightweight material is unicellular, buoyant, and has good compressibility. *American Agile Corp.*

15—Colloidal Dispersion of metallic copper in a lacquer solution provides high conductive surface coating. Dip coating is not recommended. Air-dries, can be handled in minutes. No baking. And it's cheaper than similar coatings, such as silver paint. *Acheson Colloids Co.*

16—Sea-Chem Enzymes digests excessive grease and fat in sewerage systems. Eliminates cleaning grease traps and rodding lines. Especially useful for keeping plant cafeteria drains open. *Suburban Products Co.*

Turn the page



CUT COSTS
with Wheeling Expanded Metal

...and improve your product at the same time!

Think of a metal that is *stronger* than the solid steel from which it was made. Imagine it being *lighter* than solid steel its own size. Then picture it giving *free access* to heat, light, sound and air.

That's Wheeling Expanded Metal... solid steel, pierced and *s-t-r-e-t-c-h-e-d!*

It's as ideal for grilles and bins as it is for railings and walkways... or 1,001 other uses.

It is available in a variety of light and heavy gauges for use in manufacturing, building construction and reinforcing concrete from the Wheeling warehouse nearest you. Send for complete details. Wheeling Corrugating Company, Wheeling, West Virginia.

Wheeling

WAREHOUSES: Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Minneapolis, New Orleans, New York, Philadelphia, Richmond, St. Louis. **SALES OFFICES:** Atlanta, Houston.

The BROOK is the motor you can INSTALL AND FORGET!!

Because it is no ordinary motor—the stator, rotor, windings, electrical varnish used and the bearings are designed and selected to give long, trouble-free service under the toughest conditions. Yet, BROOK MOTORS cost no more than ordinary motors—usually they cost less. No wonder so many mills, gins, quarries, factories, petroleum producers and others using BROOK MOTORS praise them so highly. Send for construction feature Bulletin 827.

Open Drip Proof (shown), Totally Enclosed Fan Cooled, Totally Enclosed Non-Ventilated, NEMA "C" and "D" Flange, Extended Shaft Pump Motors, Special Motors, Squirrel Cage or Slip Ring, stocked in a wide range of sizes.

FAST DELIVERY OF ALL POPULAR MODELS:

Brook Motors are available from warehouse at Chicago, Dallas, Jersey City, Los Angeles, Memphis, St. Paul, Salt Lake City, San Francisco, Savannah, Seattle, Tampa, and other major distributing points.

SINCE 1904

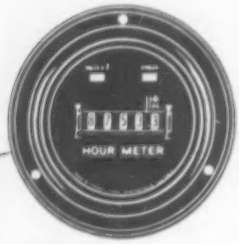
BROOK MOTOR CORPORATION

BROOK MOTOR CORPORATION

3553 W. PETERSON AVE., CHICAGO 45, ILL.

Take the guesswork out of

MAINTENANCE
UTILIZATION and
PRODUCTION records



Hobbs
HOUR METERS
for alternating current

The Hobbs AC Hour Meter indicates operating time of any machine or equipment powered by alternating current — basic time data essential in the study of utilization and production methods . . . and vital for protective maintenance programs. Wide range of applications — small, compact, easy to install. Ruggedly built and sealed against moisture and dust. Powered by an accurate synchronous motor specially designed for this instrument. Easy to read — tells at a glance accumulated time of operation to 10,000 hours, showing 1/10th hours. Also available in 100,000 hour models.

● **Ask your supplier . . . or write direct for Catalog AC-587 with complete information.**

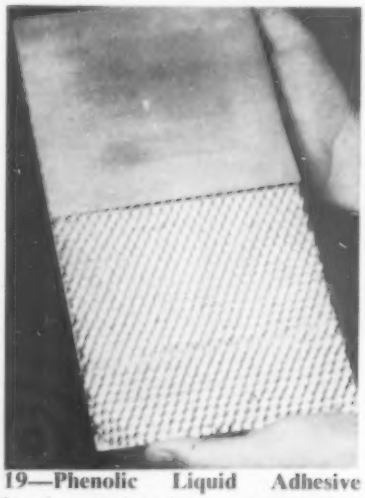
John W. Hobbs Corporation
2076 YALE BLVD. SPRINGFIELD, ILLINOIS
A Division of Stewart-Warner Corporation

FACTORY / MATERIALS NEWS
Begins on page 306

For more about these products, circle item numbers on Reader Service card next to back cover.

17—Ferroxdure is a ceramic material that can be permanently magnetized. Non-metallic and electrically non-conductive, it holds its strength under the most adverse conditions. Molds into various shapes. *North American Philips Co.*

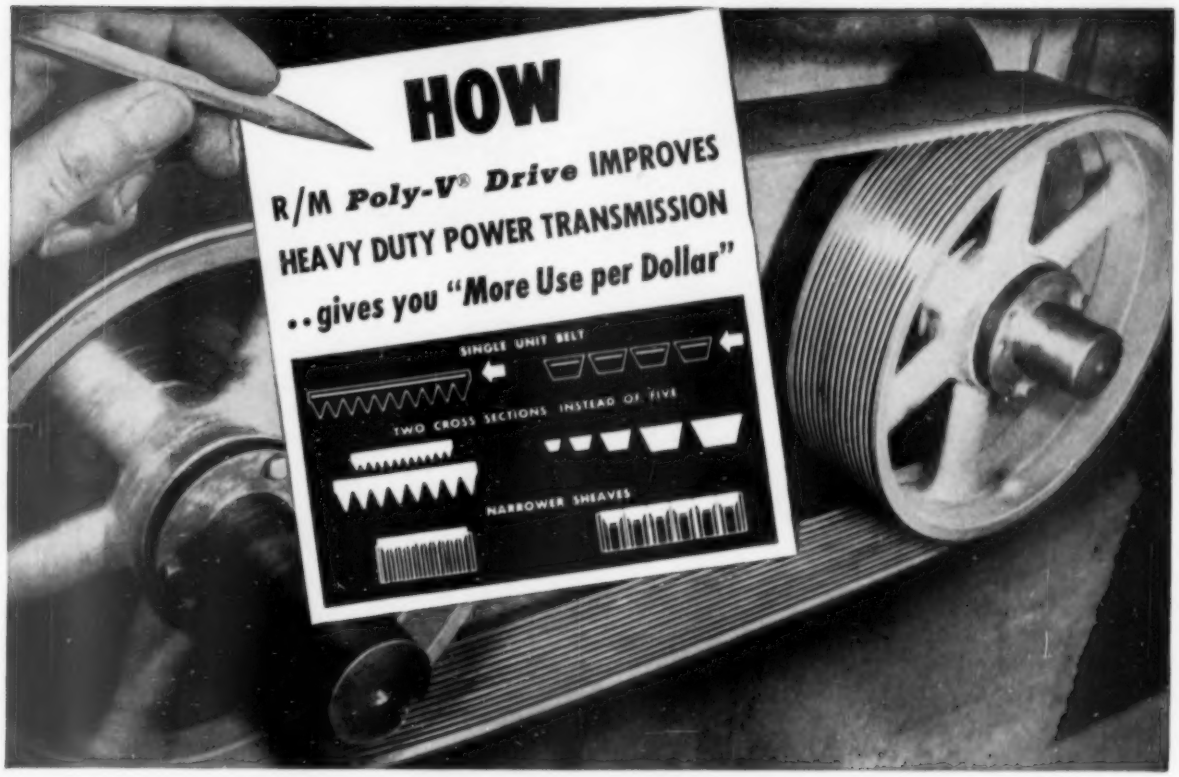
18—Powerfilm prevents concrete, clay, moist dirt, and other materials from sticking to equipment. Applies with spray, brush, or cloth to wet or dry surfaces. Dries quickly, forming a thin, waxy coating. And it's never gummy. *The Thomas Co.*



19—Phenolic Liquid Adhesive bonds metal facings to core material in the production of honeycomb structures. Also used for bonding metal-to-metal panels. Needs clean, dry, grease-free surface. Maintains high strength properties over temperature range from –65 to +180 F. *Minnesota Mining & Mfg. Co.*

20—Isonel, a Class B varnish for insulating in combination with Class B wire enamel. This polyester has heat resistance similar to Class B wire enamels. Cures to a tough, solid mass at temperature of 180 C. *Schenectady Varnish Co.*

21—Hi-Cor is an active organic flux for non-electronic applications. Speeds soldering, minimizes corrosion, leaves no sticky residue. Available in all usual and many special alloys. *Alpha Metals, Inc.*



R/M *Poly-V® Drive*

Delivers More Power in Less Space!

No other belt drive can deliver as much power in the same space. It's R/M's patented Poly-V Drive developed by R/M engineers after years of research. This totally new concept in power transmission delivers up to 50% more power than a conventional V-belt drive of equal width.

Unique design accounts for the unusual power capacity of R/M Poly-V Drive. A *single, endless* belt with parallel V-ribs runs on sheaves specially designed to mate precisely with the belt ribs. The uniform pull of this single unit belt distributes drive load evenly over the full width of the sheave . . . gives higher horsepower capacity per inch of drive width than ever before possible.

There are many advantages in this space-saving drive wherever heavy duty power transmission is required . . . in the equipment you manufacture—or the equipment you use in your plant. Poly-V Drive has eliminated the matching problems of multiple V-belt drives, greatly increased the life expectancy of belts and sheaves and maintains more constant speed ratios under all loads. Just *two* cross sections of Poly-V meet every heavy duty power requirement—R/M Poly-V Drive cuts costly belt and sheave inventories to a new low!

Let the R/M engineers who developed Poly-V Drive work with your engineers to improve your power transmission applications. Contact R/M . . . or write for a copy of Poly-V* Drive Bulletin #6638.

CONDOR V-BELTS • R/M SUPER-POWER V-BELTS

Write for Bulletin #6868 on the complete line of Condor V-Belts for regular service on conventional V-belt drives. Also write for Bulletin #6628 on R/M Super-Power V-Belts with 40% more Horsepower capacity where needed.

**Poly-V is a registered Raybestos-Manhattan trademark*

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

A manufacturing first!

FORD and WESTINGHOUSE engineers put CO_2 welding in the production line

71 WEST-ING-ARC units are now on the automated production line at the new Sterling, Michigan, FORD plant.

WEST-ING-ARC and a new concept of CO_2 welding are used for this automated production line because they provide welds strong enough to handle the increased torque of the new Fords.

Stronger welds were obtained with CO_2 with a reduction of from 12 to 25% of the materials costs, and welding time for the operation reduced approximately 30%. Because no abrasive flux is used in the new method, maintenance on the machines and materials-handling equipment has been virtually eliminated.

Do you have a production application that could benefit from the exclusive advantages of the new WEST-ING-ARC CO_2? For more information, write Westinghouse Electric Corporation, Welding Dept., P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21958-X

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

NEW Rapistan METHODS OFFSET YOUR RISING COSTS

Conveyors that grow with your business give many new savings in materials handling

Ceiling-mounted gravity wheel conveyor lines speed traffic flow and relieve floor congestion. Added space is available for storage or production.

Don't expect to get just a cut in labor costs when you buy a new handling system or improve your old one. With new developments in Rapistan handling equipment, you can now count on such new savings as increased storage space, elimination of traffic congestion, lowered inventory needs and improved shipping speed.

The Rapistan plan of using only standardized units in engineered systems is a practical way to use new conveyor ideas without an unreasonable capital investment in new equipment.

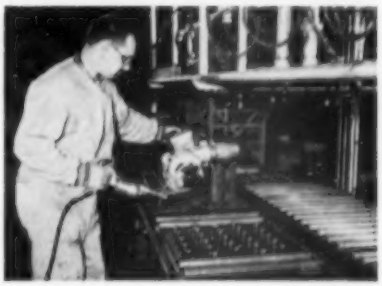
A Rapistan system installed perhaps a year ago to cut handling costs by 20% can be changed this year to incorporate still newer ideas. A few accessories and controls can be added to provide another sizeable cut in handling costs in other areas of your operation. This can be done because Rapistan units are standardized and interchangeable—a unique profit-saving idea in an industry where changes occur every year.

SIMPLIFIES TRAFFIC FLOW New methods are now being used to improve traffic flow with Rapistan gravity wheel conveyors. By using your air rights and even underground space, congested floor traffic may be eliminated. This means savings in labor costs as well as new floor space for production or storage.

SPEEDS PRODUCTION AND ASSEMBLY A new Flow Bench principle uses standard Rapistan live roller conveyor units to set up progressive assembly lines that hold, move or accumulate products being assembled. Secondary assembly and small volume lines can now be set up economically with work stations relocated or changed as needed.

INCREASES STORAGE, SPEEDS SELECTION Storage, order selection and shipping costs can be slashed with a Rapistan Flow Rack. A third dimension is added to your storage, saving both space and speeding selection with "first in, first out" material movement. Inventory control also is simplified.

These and other new ideas from Rapistan can keep cutting your materials handling costs. Tell us your present handling problem. We'll send you illustrated Field Reports showing how Rapistan engineers have solved the same problem and saved money for others.



Flow Bench uses standard units for progressive assembly lines. Work stations are quickly changed or relocated.

Flow Rack adds new dimension to storage. Saves space, speeds order selection, simplifies inventory control, accumulates work-in-process.

The RAPIDS-STANDARD CO., Inc.
728 Rapistan Bldg. • Grand Rapids 2, Mich., U.S.A.

Rapistan® BETTER CONVEYING EQUIPMENT
•GRAVITY CONVEYORS •POWER CONVEYORS •OVERHEAD CONVEYORS

INCREASE PRODUCTION

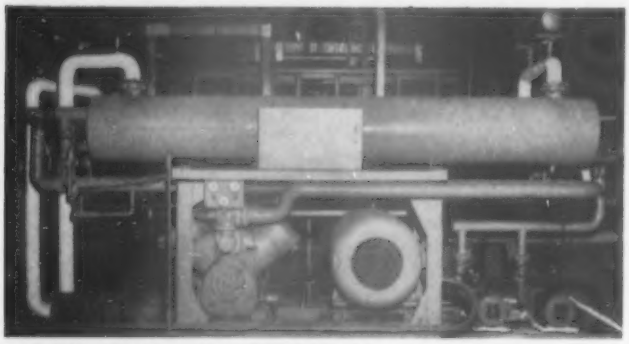
LOWER PRODUCTION COST

with Acme

PACKAGED LIQUID CHILLERS

Whether your production process requires cooling at many stages or only one, you can increase production and lower costs with Acme Packaged Liquid Chillers. With Acme you get a complete range of models, with capacities to fit your exact job requirements. Ranging in capacities from 2 through 300 tons Acme liquid chiller packages are the most completely engineered packaged units available today. All controls — electrical and mechanical — are supplied complete and ready for simple installation. When you buy an Acme Packaged Chiller it arrives on the job completely assembled ready for connection to power and liquid lines. Acme Packaged Chillers have been proven in varied types of installations throughout the country. They have met all air conditioning, heat pump and industrial processing requirements.

Photo shows how compact, 5-ton capacity Flow-Cold Liquid Chiller is mounted on beams above the plating tank in the Howard Plant to save floor space.



PROCESS COOLING INSTALLATION—This 100-ton Flow-Therm Packaged Chiller and a Dry-Ex fluid-to-fluid Heat Exchanger is cooling Zinc Cyanide Plating solution at Ford Motor Company's Sandusky, Ohio Plant. Installation was handled by Udylite Corporation under the supervision of J. K. Rawsthorne, Sales Engineer for J. Geo. Fischer & Sons, Detroit, Mich.

Send for your copy of the new Acme Packaged Chiller Catalog.

CONTROL ANODIZING, PLATING PROCESSES

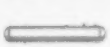
In their modern plant at Royal Oak (Detroit), Michigan, Howard Plating Industries, Inc., installed a 5-ton capacity Flow-Cold Liquid Chiller to maintain a constant temperature in their anodizing process. Chilled water, circulated through lead pipes in the tank, keeps the sulphuric acid solution within ±2° of the temperature needed for top quality anodizing in volume production. Pleased with the dependable performance, Howard has installed additional units for process temperature control.

Acme packaged chillers are tested under full load conditions before leaving the factory. Your assurance of this guaranteed dependability is the Acme Certificate Of Performance issued on all packaged liquid chillers 3 to 150 tons.

ACME AIR CONDITIONING REFRIGERATION

Acme INDUSTRIES INC., Jackson, Michigan

Dry-Ex Liquid Chillers



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Heat Exchangers

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Packaged Chillers

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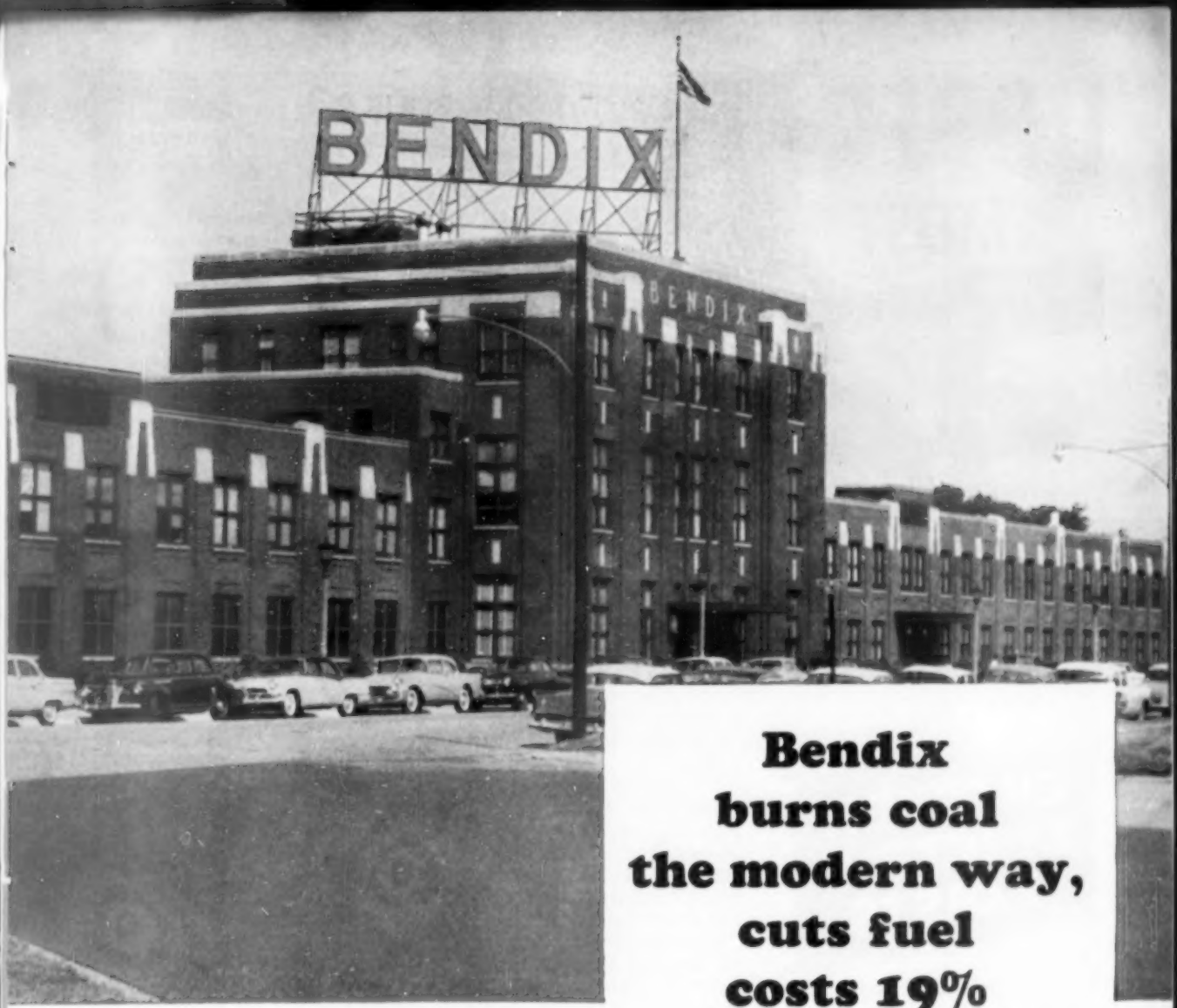
Manufacturers of Quality Air Conditioning and Refrigeration Equipment since 1919



Bendix burns coal the modern way, cuts fuel costs 19%

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

At its Products Division, South Bend, Ind., Bendix Aviation Corporation undertook extensive modernization of its power system. The firm replaced two 511 HP boilers with two 80,000 lb./hr. spreader stoker fired units. A 500-ton overhead bunker and coal elevator-conveyor system were installed. Additional changes were made including an increase in the capacities of the water and air systems.

Today fuel costs at Bendix have been cut 19%, efficiency boosted from 70% to 82%, maintenance costs lowered 80% and availability upped from 50% to 96%. By burning coal the modern way, Bendix is saving many thousands of dollars yearly and will amortize the cost of modernization in a comparatively short time.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

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Southern Building • Washington 5, D. C.

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¼ to 2-ton capacities

The most your money can buy in electric hoist quality and performance—this is it, wrapped up in the tough, Chester Model E Electric Hoist package.

How tough? Enough to stand the hardest use. Take the high-torque motor, for instance. It's not *adapted* for hoist use—it's *especially designed* for it. Result: a motor that can be run under full load for 30 minutes with no more than a 55°C. temperature increase—top rating for any hoist in this class.

Find out why Model E Hoists run cooler, operate smoother, last longer and require less maintenance. Call your distributor or write us today for complete data on the Model E Electric Hoist line. Request also specification data on the complete Chester line of hand hoists and overhead trolleys.

CHESTER HOIST DIVISION

The National Screw & Mfg. Co.

National

LISBON, OHIO

New Frontiers for Professional Managers—What are the place and prospects of major corporations in our tremendously expanding economy? How should companies be organized and managed for the continuing good of stockholders, employees, customers, and other "publics?" The management of General Electric Company — for obvious reasons — had those questions very much on its mind. And conducted studies to answer them.

In this book, G-E President Cordiner tells in detail how G-E has moved toward decentralization as the answer to this problem. The basic philosophy: "Responsible decentralization makes it possible to provide at once the big results that come from big enterprises, with the human freedom that comes from respecting the competence and dignity of every individual in the enterprise."

Columbia Business School Dean Courtney C. Brown says, in the preface: "This kind of authoritative interpretation of modern management methods is close to the heart of a real understanding of the American business system."

Plant operating men interested in the business system as such—and we all should be—will find a lot to think about in this informative account of one company's approach to the "new frontiers."

By Ralph J. Cordiner. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 128 pages. $2.75.

A Primer to the Automatic Office—Designed as a "first book" for those who want to know what office automation is and how to apply it to their office. Major points covered:

. . . Thorough analysis of a present system is needed before investigating machines for automation.

. . . Where automation is economically justified, it is quite easy to attain. Because there are now a whole range of standard machines that are capable of handling most jobs.

. . . Examples of integrated systems in many types of companies. Most of the examples are from industrial plants.

. . . All important types of systems between manual and computer.

By Eustis, Dresser, Wyman, and Alden. Automation Management, Inc., Westboro, Mass. 103 pages. $7.50.

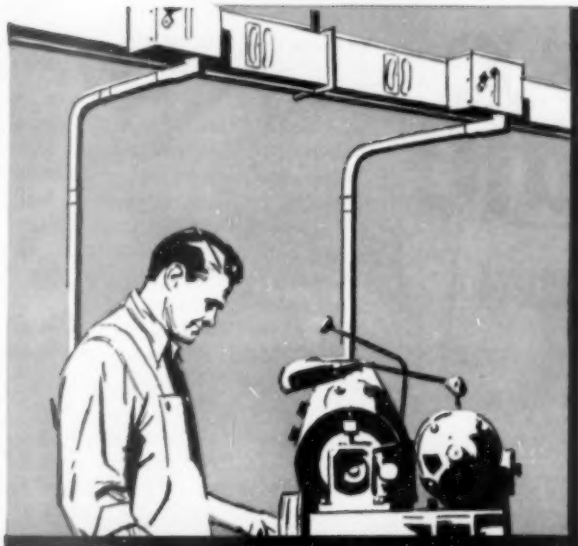
Succeeding With Profit Sharing — The results of a survey of 200 profit-sharing companies, and 18 case studies. Some of the findings discussed in the book: superiority of oral over written or visual communications for getting the profit-sharing idea across; importance of direct communication between top management and employees on profit-sharing matters; lack of effectiveness of foremen in profit-sharing communication; amount of communication on the subject between employees; close relationship between the successful communication program and the successful profit-sharing plant. Case studies are fully reported, presented in such a way that similar kinds of information on each company can be compared.

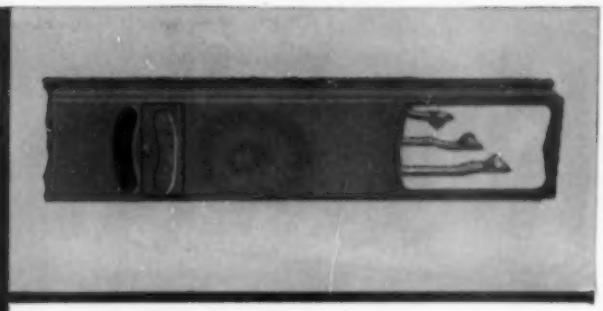
By J. J. Jehring. Profit Sharing Research Foundation, 1718 Sherman, Evanston, Ill. 164 pages. $4.

A Review of Literature Pertinent to the Design and Use of Effective Graphic Training Aids—From over 1200 references on psychology, audio-visual education, advertising, and communications, this book pulls together the best available standards, specifications, and criteria for the design, preparation, and application of effective two-dimensional graphic training aids. Contains chapters of annotations on design. A good reference for plant men with training responsibilities.

By E. V. Saul et al. Office of Technical Services, U. S. Dept. of Commerce, Washington 25. 219 pages. $5.

Introduction to Printed Circuits—Printed circuits are turning up in more and more electronic components — not just communications equipment, but controls and the like. And so it behooves the smart plant man to have an idea of how they're produced and how they're





STANDARDIZED 10′ SECTIONS have 10 plug-in openings—5 on each side. Exclusive crescent-shaped openings insure proper insertion of plugs and accommodate plugs from 30-amp to 600-amp capacity.

PLUG-IN POWER INSTANTLY . . . BullDog bus plugs are equipped with reinforced fingers to engage bus bars for maximum positive pressure contact. Compact design and minimum weight insure ease of installation, full use of plug-in openings.

MORE SAFETY— MORE SATISFACTION— MORE SAVINGS

...WHEN YOU INSTALL BULLDOG PLUG-IN DUCT

Keeps pace with your power needs today and tomorrow!

A sound investment—now and in the future! Installing BullDog Plug-In Duct for branch circuits provides a flexible distribution system to meet all immediate and future needs.

Plugs are designed exclusively for BullDog Plug-in Duct . . . offer safe, convenient tap-off and positive branch circuit protection. They mount on either side of the duct with ease, speed and safety—are so compact they permit maximum use of duct openings. Safety-engineered to insure correct polarization, the plugs *cannot* be inserted improperly.

Seven different, interchangeable plugs—Vacu-Break®, Fusible, Circuit Breaker, Capacitor, Transformer, Ground Detector, and Temperature Indicating—provide a type and size to meet every application.

These and other advantages make Plug-In Duct first in its field . . . add up to more safety, satisfaction and savings for you. See your BullDog field engineer or qualified contractor for details or write BullDog Electric Products Company, Detroit 32, Michigan.

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—to do any jacking job better!

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Re-Mo-Trol HYDRAULIC PULLERS
(PUMPS AND REMOTE CONTROLLED RAMS)
10 to 100 ton capacities

UNIQUE "CENTER-HOLE"* minimizes rigging and set-up—provides more effective power.

Simplifies tough pulling jobs! Pull rod or screw is drawn *through* ram plunger in straight, torque-free pull. Ram is own backup. Also lifts or presses.

*"Center-Hole" in rams of 30 ton and greater capacities.

RATCHET LOWERING JACKS
Lift or lower the load notch by notch. Cannot be tripped. *Toe* has *same capacity* as cap! High lift with minimum clearance means less set-up, less blocking. Single or double acting. 1½ to 20 ton capacities.

HYDRAULIC JACKS
Fast, easy power! Operate vertically or horizontally with same efficiency. Tested to 50% over rated capacity. Single or double pump models; 3 to 100 ton capacities.

SCREW JACKS
Cap floating on single chrome-moly ball reduces friction 88%. Forged cap corrugated for safety. Malleable iron base flared for stability. Four-way or ratchet heads. 10 to 24 ton capacities.

Other SIMPLEX JACKS include:
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Push and Pull Jacks and Accessories
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LEVER . SCREW . HYDRAULIC
Jacks

TEMPLETON, KENLY & CO. 2517 GARDNER ROAD, BROADVIEW, ILL.

maintained. This little book covers that subject in interesting form. Discusses all the important production methods, and illustrates them well with pictures and diagrams. Interesting, informative, and broad-scope—though not a complete handbook of engineering information.

By Robert L. Swiggett. John F. Rider Publisher, Inc., 480 Canal St., New York 13. 101 pages. $2.70.

Industrial Ventilation Manual — New and enlarged fourth edition of this useful book is now available. Covers hood and duct design, dilution, ventilation, comfort ventilation, make-up and recirculated air, construction specifications, system testing, fans, air cleaning devices.

Committee on Industrial Ventilation, American Conference of Governmental Industrial Hygienists, P. O. Box 453, Lansing 2, Mich. $4.

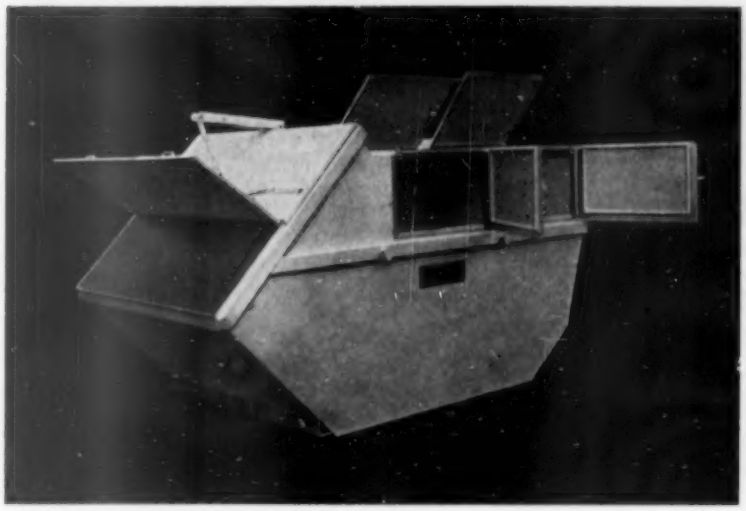
National Standards in a Modern Economy—This is both a review of the evolution of standards and an evaluation of their crucial place in the world today. Covers the legal aspects of the use of standards, their relation to industrial self-government (as in safety, for example), their impact upon individual enterprise and the economy as a whole.

Each of the 33 chapters is written by an expert in that phase of the standards field. They cover the movement toward standards; standards development in many industries (food, communications, agriculture, food and drug, textile); standards development covering industrial functions (safety, quality); effect of standards on automation.

Edited by Dickson Reck. Harper & Brothers, 49 E. 33rd St.. New York 16. 372 pages. $5.

Labor Institutions and Economics—Dealing with organized labor is one of the most important responsibilities of many plant operating men. So it pays to back off, from time to time, from the day-to-day problems, and take a look at the broad problem. This book is designed to show the major purposes and problems of organized labor, and point out the basic significance of recent developments—such as the AFL-CIO mer-

RATS... RUBBISH... HIGH DISPOSAL COSTS



...the LOAD LUGGER® system of refuse removal licks them all!

Clean premises and sanitary conditions prevail in plants which have adopted the Load Lugger system—most modern, sanitary and economical refuse removal method ever developed. A single Load Lugger equipped truck—and only one man, the driver—services dozens of patented leak-proof, vermin-proof, odor-proof detachable steel Load Lugger containers.

The versatile Load Lugger system saves dollars, makes sense—not only for garbage and rubbish removal but for maintenance work and general materials handling.

Investigate the Load Lugger system for your plant—send for eye-opening facts and figures.

Easiest in the world to load, Load Lugger containers have rubber-sealed doors at top, sides and end—*can be charged from ground level!*

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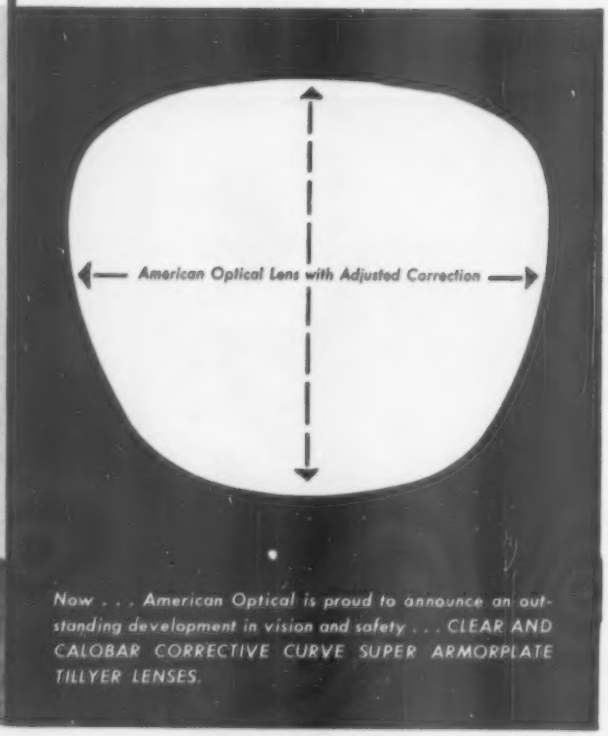

Now . . . American Optical is proud to announce an outstanding development in vision and safety . . . CLEAR AND CALOBAR CORRECTIVE CURVE SUPER ARMORPLATE TILLYER LENSES.

AO Ultrascopic Safety Glasses with Balanced Vision are the Ultimate in Eye Protection

There are over 420 combinations in the American Optical line of metal (F5100 series) and plastic (F9500 series) safety glasses. You can give every worker the type of eye protection he needs. You can fit any worker. SEE THESE SAFETY GLASSES WITH BALANCED VISION — call your nearest American Optical Safety Products Representative.

The Big Benefit is BALANCED VISION

With "compensated" or balanced vision throughout the lens, the worker obtains optimum seeing qualities from his glasses whether he looks up, down, laterally or straight ahead. Naturally, this "balanced vision" will increase visual efficiency and safety on the job . . . reduce production and eye accident costs. This advance is available in all regular prescription ranges.

DR. EDGAR D. TILLYER, Internationally recognized Dean of Ophthalmic Lens Design.

Facts about the AO TILLYER Principle of ADJUSTED CORRECTION

Lenses which interpret the services of the ophthalmic profession should be constant in $R_{\frac{1}{2}}$ power from center to edge. Such constant $R_{\frac{1}{2}}$ power depends upon achieving a balance between marginal sphere and cylinder characteristics of the lens. For over thirty years the Tillyer Principle has been the accepted standard in achieving this balance. Now, new computations make it possible to apply the well-known Tillyer principle to safety thickness S.A.P. Lenses.

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Always insist on the AO trademark on lenses and frames.

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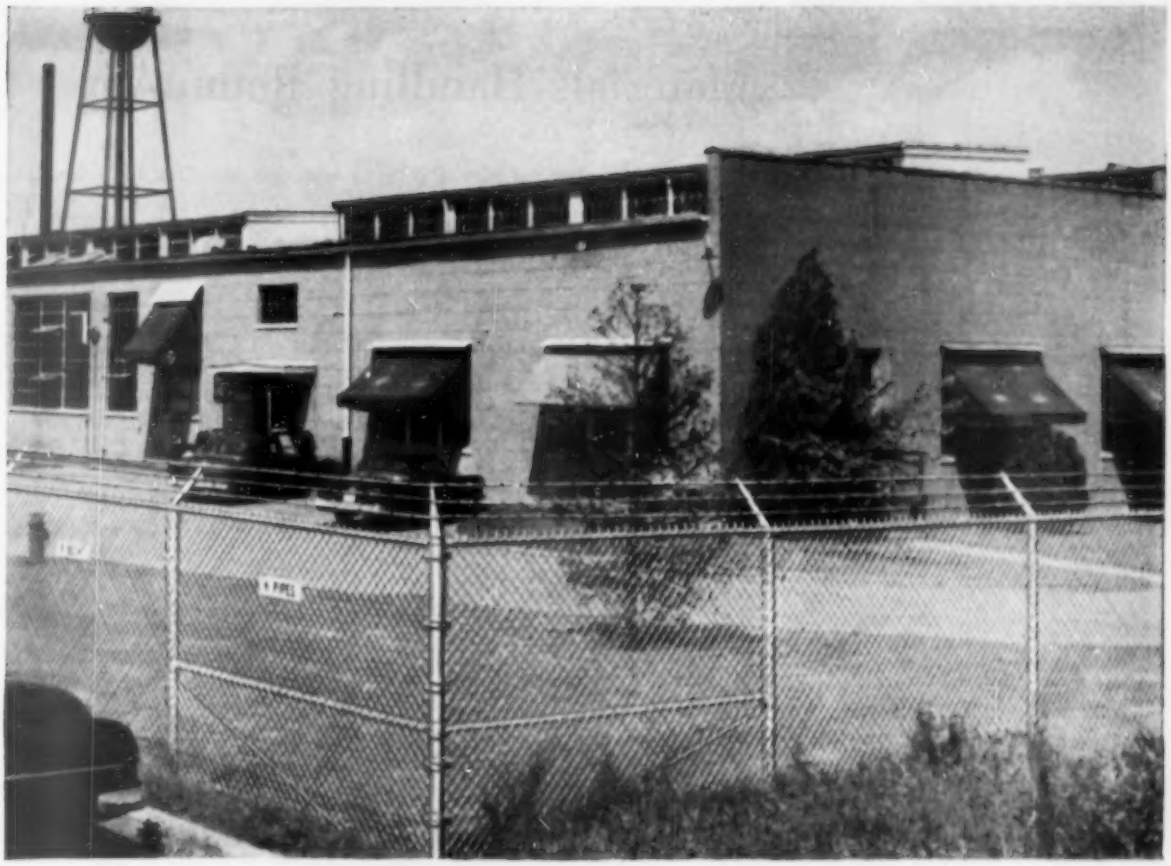

An important point for you to consider...

All-aluminum chain link fence costs less than rustable fencing that has been painted once

Around plants, warehouses and other industrial buildings, all-aluminum chain link fencing provides real savings on maintenance costs. In addition, it adds bright beauty to enclosed areas.

Aluminum is rustproof, lasts longer because it resists corrosion and never needs painting. You save not only on replacement costs, but also on the material and labor normally required for painting which is a needless recurring expense.

Adds beauty to enclosed areas. Aluminum fencing retains its bright, metallic appearance for years. Aluminum fencing never becomes an "eyesore" like rustable metal fencing.

Reynolds Metals Company does not make aluminum fencing. But Reynolds supplies quality aluminum to leading chain link fencing manufacturers. Their names will be furnished on request. *Reynolds Metals Company, P. O. Box 1800-NJ, Louisville 1, Kentucky.*

Write above address for suggested specifications for All-Aluminum Chain Link Fencing.

See "CIRCUS BOY", Reynolds new dramatic series, Sundays, NBC-TV

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

Follow the example of thousands of masonry bit users — large and small — who use the WORLD'S ONLY COMPLETE LINE OF CARBIDE-TIPPED MASONRY BITS — For every drilling requirement — to cut time and labor costs —

Switch to

New England
CARBIDE-TIPPED
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They Make Tough Drilling Jobs Easy! — Speed Work! — Cut Labor Costs! Drill Any Size & Depth of Hole!

Even experts are amazed when they first learn what New England Carbide-Tipped Masonry Bits can do to make tough drilling jobs simple — and cut labor costs UP to 82%! From fast rotary drilling in soft and medium hard masonry to the toughest jobs in hard concrete or granite — there's a New England Carbide-Tipped MASONRY BIT for every kind of job, and a bit to fit any make or type of drill.

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Cyclo-twist®
ROTARY BITS
For ROTARY DRILLING of Medium Masonry — Sizes 7/64" to 1½"

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For ROTARY DRILLING of Hard Masonry including Hard Concrete and Vitreous Tile, Sizes ¼" to 6"

Thunder-twist®
HAMMER BITS
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DISCOVER THE "EASY" WAY FOR EVERY DRILLING JOB! Write for our "WHAT and HOW" MANUAL. It's FREE, and very helpful.

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Materials Handling Round-Up

Following is the second part of a list of materials handling films compiled by the Material Handling Institute (Suite 759, One Gateway Center, Pittsburgh 22). Part I of this listing appeared in October FACTORY, page 304. All films are available from member companies of the MHI without charge, unless otherwise indicated.

OVERHEAD HANDLING

Up and Over. 16mm, black and white, sound, 20 min.

American Monorail Co., 13107 Athens Ave., Cleveland 7.

SAFETY

Safety Saves. A new training and safety film for industrial truck operators, filmed at on-the-job factory and warehouse locations. It dramatically illustrates the "do's and don't's" of safe driving, and shows the cause of most truck accidents and how to avoid them. For truck owners who want to reduce accidents and cut damage to goods, this film will be a valuable training tool. Industrial truck users were enthusiastic in their acceptance of Clark's "Safety Saves" cartoon booklet, published in 1951. The "Safety Saves" movie was produced in response to hundreds of requests from truck users who expressed the need for a driver training film. 16mm, black and white, sound, 25 min.

Clark Equipment Co., Battle Creek, Mich.

SPECIAL EQUIPMENT

Materials Handling Magic. Showing a side-loading fork truck, the Traveloader, in a lumber application. Additional footage showing various other applications will be added in the near future. Company requests film be insured for $100 when returned. 16mm, color, sound, 12 min.

Baker-Raulang Co., Adv. Dept., 1250 W. 80th St., Cleveland 2.

The Time Has Come. This film is a demonstration of how the Clark Mobilval System can be used for the transfer of freight between destination by rail and truck. It also demonstrates its use in inter- and intra-plant movement of materials. 16mm, black and white, sound, 18 min.

Clark Equipment Co., Battle Creek, Mich.

Over-the-Load Materials Handling. This film illustrates how Straddle Carriers are employed in a wide variety of industries handling many different types of materials. Here you see how one man and a machine can move phenomenal amounts of material at great speed with no time lost loading or unloading. You will see proven methods of cutting costs to the bone and doing the job faster. 16mm, black and white, sound, 28 min.

Clark Equipment Co., Battle Creek, Mich.

Porta Dock. Movie of the Porta-Dock showing its features and how it is used. A written commentary describes the various scenes. 16mm, black and white, silent, 14 min.

Raymond Corp., Greene, N. Y.

Reach Fork Truck. Shows application of maker's "Reach Fork Truck," narrow aisle operation and other features. 16mm, sound, black and white, 12 min.

Raymond Corp., Greene, N. Y.

STEEL STRAPPING

Following films are all available from:

Acme Steel Products Div., Acme Steel Co., Box 830, Archer Ave., Chicago 8.

Unit-Load Methods. Shows impact tests conducted by AAR on rigidly braced and floating loads of sewer pipe in an open-sided car. Also

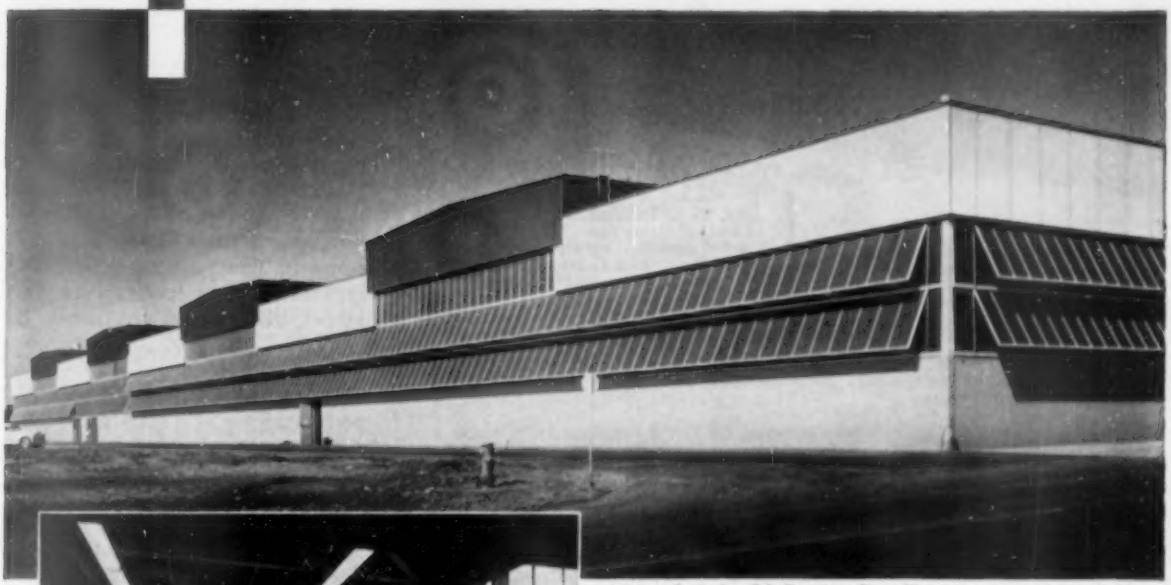
LIGHT and AIR without HEAT and GLARE

Coolite Installed in Top Hinged Windows Floods Factory with Conditioned Daylight

Excellent ventilation and plentiful, eye-easy, natural illumination promote employee efficiency and morale in this United States Electric Motor Plant, Anaheim, California. The hinged windows are glazed with Coolite, Heat Absorbing, Glare Reducing Glass to provide the finest, low-cost daylighting.

Coolite diffuses better light deep into interiors, eliminates contrasts that cause costly visual errors. Coolite absorbs up to 50% of unwanted solar heat rays, helps keep work areas cooler. Employees see better, feel better, work better, under "Cooliting."

This outstanding plant also uses diffusing Wire Glass for excellent daylighting plus protection against breakage and fire in vulnerable areas. Installed in doors, windows, skylights, Mississippi Wire Glass (Approved Fire Retardant No. 32) helps to bottle up small fires . . . keep them from roaring into costly conflagrations.



Architects: Smith, Powell & Margridge. Three Mississippi patterns were employed in this plant: Coolite, Heat Absorbing, Glare Reducing Glass, 19,212 sq. ft., Smooth Rough, 5,256 square feet; Coolite Wire, Glare Reduced, 5,377 sq. ft.

Let Coolite brighten your production picture with better daylighting. Specify glass by Mississippi. Available in a wide range of patterns and surface finishes through leading distributors.

Write today for free literature.
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MISSISSIPPI GLASS COMPANY

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WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

"Here's why Tetley Tea employees like working under Lustra Jade-Lites"

MR. V. PITEO, Plant Superintendent of Tetley Tea Company, tells how the company's recent installation of Lustra Jade-Lite Fluorescent Lamps has resulted in improved employee relations.

The Lustra Jade-Lite Fluorescent Lamps installed at the Tetley Tea plant give *more* light with *less* glare in working areas—make seeing easier, prevent eye-strain.

MR. M. L. ROCKFELD, Lustra Lighting Specialist, contributed his specialized experience to fulfilling Tetley's objective of better plant lighting conditions.

"In our constant search for ways of improving employee relations here at Tetley Tea," says Mr. V. Piteo, Plant Superintendent, "we have been especially impressed by our workers' reaction to our installation of Lustra Jade-Lite Fluorescent Lamps.

"The main thing our employees comment on is the freedom from glare. They finished the day with no feeling of eye-strain. We've found, too, from our own checks that the Lustra Jade-Lites give substantially more light to make working conditions better, and that they are far superior in *maintained* light output."

Plant after plant reports similar advantages through the use of Jade-Lites. *Plus*, of course, such features as increased safety, higher output, fewer rejects and greatly reduced lighting maintenance costs.*

It will pay you to get the facts on the complete Lustra line for every lighting requirement: Double Duty Incandescent and Fluorescent Lamps, Hi-Bay Reflector Lamps, Concentrators for localized lighting, Weatherproof Spotlites and Floodlites, Rough Service and Vibration Service Types, Industrial Infra-Reds, Fluorescent Fixtures.

*Lustra Lamps are GUARANTEED for extra-long burning life. Find out how our GUARANTEE on our DATED Lamps assures this longer burning life.

Send for complete descriptive literature.

Lustra Corporation, Dept. FM 11-56
36 Washington Street, Brooklyn 1, N. Y.

YOUR LOCAL LUSTRA MAN will be pleased to give you the benefit of his specialized experience on YOUR LIGHTING PROBLEMS. He can show you how with LUSTRA DOUBLE-DUTY GUARANTEED DATED LAMPS you can "See more and save more."

Lustra
AMERICA'S DATED LAMPS

Begins on page 326

covers loading and bracing methods used on acid carboys and washing machines. 16mm, black and white, silent, 28 min.

Bundling Hardwood Flooring. Conveyorized strapping of bundles of hardwood flooring. Shows how a bunk load (master bundle) of individual bundles is formed and handled during warehousing and carloading with fork lift trucks. 16mm, black and white, silent, 30 min.

Strapping Textile Cartons. Covers strapping cartons on textiles on conveyor lines and the friction seal method of baling. 16mm, black and white, silent, 24 min.

Carloading Bundled Lumber. How lumber is bundled and loaded on flat cars. Compares speed and efficiency of unloading bundled lumber from box cars by hand. 16mm, black and white, silent, 15 min.

Strapping Export Cartons. Shows conveyor line set-up for strapping export cartons on surgical dressings. 16mm, black and white, silent, 10 min.

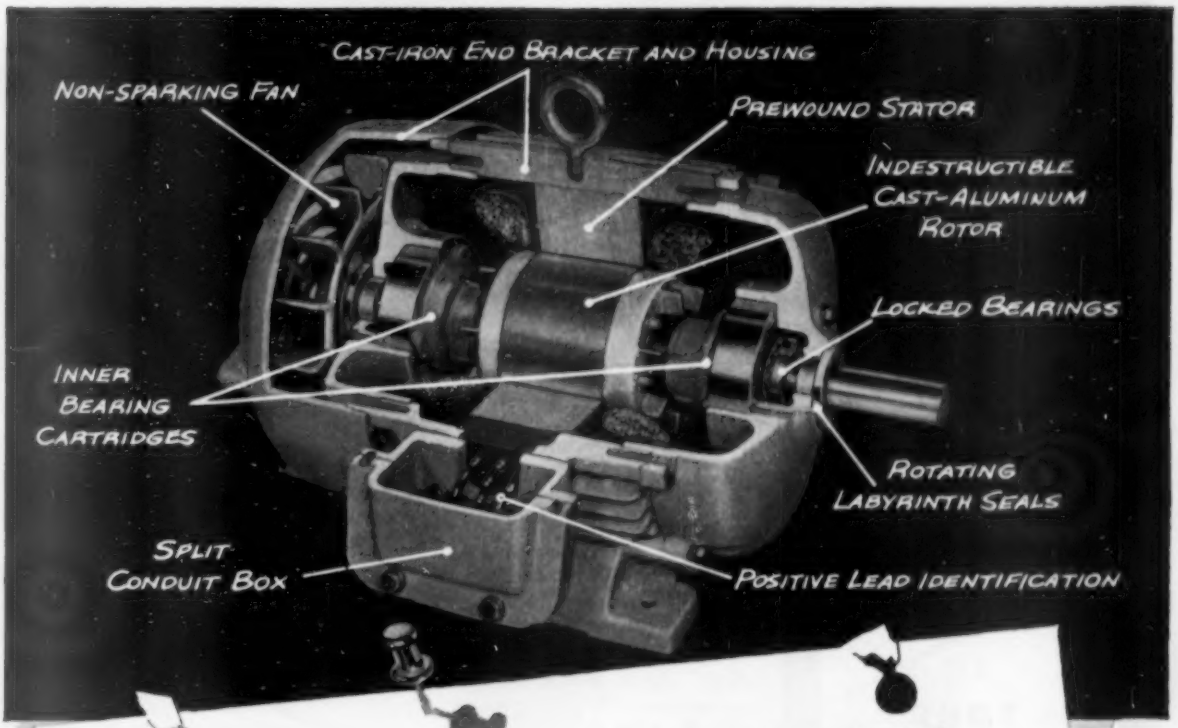
Skidding and Carloading Sheet Paper. Strapping skid loads and boxed sheet paper. Covers bracing of carload shipments of skids of paper. 16mm, black and white, 20 min.

Strapping Export Cases of Canned Beer. Illustrates handling systems in a modern brewery and the strapping of export cases of canned beer on a conveyor line. 16mm, black and white, silent, 20 min.

Packing and Strapping Knocked-Down Metal Cabinets. Shows plant operations and the conveyorized methods of packing and strapping long flat cartons of knocked-down metal cabinets. 16mm, black and white, silent, 10 min.

Lock Flap Cartons. B1B Pneumatic Stretchers used to strap lock flap cartons. 16mm, black and white, silent. 10 min.

Strapping Cartons of Aluminum Extrusions. The FI Strapping Machine



Are you getting all these extras in the motors you buy?

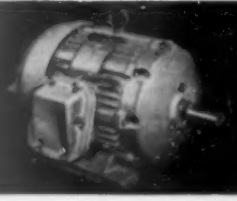
Louis Allis gives them to you in the new L. A. enclosed and explosion-proof motors

For years, Louis Allis has specialized in special motors for many of industry's toughest drive problems. Such installations call for extreme care in both motor design and manufacture—care that has become a habit with us. We build our enclosed and explosion-proof motors with the same special care.

What does this mean to you? It means that you get a motor with extra features—a motor that runs better, lasts longer. Here are a few of the extra reasons why:

- These new motors carry Underwriters' label for use in four groups of hazardous locations—Class I, Group D, and Class II, Groups E, F, and G. This four-group approval for a single motor simplifies your stocking problem.
- New, exclusive phenolic impregnating varnish provides high thermal and chemical resistance. It remains resilient and resists aging, prolonging the life of the motor.
- Inner bearing cartridges lock bearings to end bracket and form explosion-quenching seal along the shaft. Inner race of bearing locked to shaft, reducing end play—an extra quality feature.
- Rotating labyrinth seals keep dirt and moisture out of the bearings—keep grease in.

There are many other features such as a new diagonally split conduit box, sturdy cast-iron construction, positive lead identification, non-sparking fan. Our new bulletin No. 1700 shows why you get extra value for your dollar in a Louis Allis explosion-proof motor. Write for your copy.



New LA line explosion-proof motors are available in rerated frame sizes 182 through 326U, and in ratings of 1 to 30 hp, 3 phase, and 1 to 5 hp, single phase. Also available with Underwriters' approval for Class I, Group C hazardous locations.

EP-103

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

reinforces and closes long narrow cartons of aluminum extrusions. 16mm, black and white, 8 min.

GENERAL HANDLING

Pay Load Pays Off. The film is dedicated to the materials handling specialist who, by substituting electric power for labor's sweat, helped develop mechanical load-handling and stacking that reduced unit costs and thus automatically helped make prices lower. Film was produced under a grant from Automatic Transportation Company of Chicago, as its contribution to the first National Materials Handling Exposition and is loaned without charge to all industrial management, engineering societies and colleges, and others interested in mechanized handling. 16mm, sound, 25 min.

Automatic Transportation Co., 100 W. 87th St., Chicago 20.

The One Man Gang. A film on materials handling (mass handling). 16mm, sound, black and white, 35 min.

Towmotor Corp., 1226 E. 152nd St., Cleveland 10.

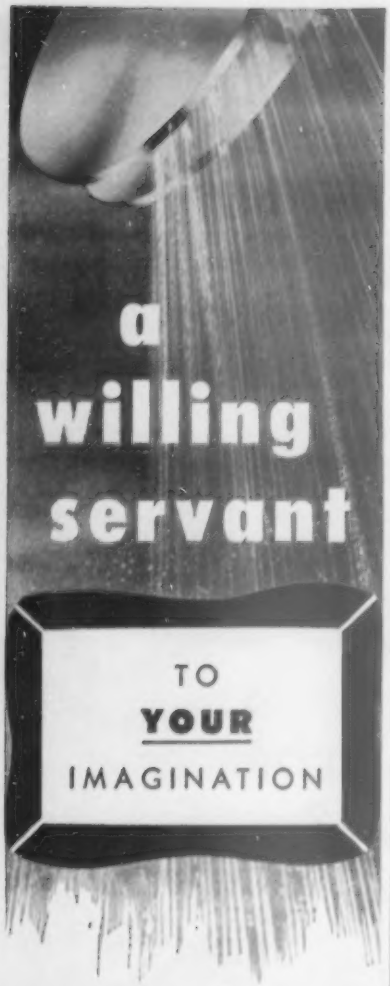
It's Your Money. This film covers our complete range of electrical industrial trucks showing all basic types in operation in many different industries. 16mm, black and white, sound, 38 min.

Yale & Towne Mfg. Co., Adv. Dept., 11,000 Roosevelt Blvd., Philadelphia 15.

Top Performance. A film version of Yale & Towne's famous traveling road show. Complete Yale line, lifting, moving, and stacking a multiplicity of loads in a diversity of applications. 22 min.

Yale & Towne Mfg. Co., Adv. Dept., Philadelphia 15.

Materials Handling Newsreel, Issue No. 2. Scenes of loading and unloading highway trucks, railroad flatcars in the yard of a manufacturing plant; the novel loading operation of a heavy fork-lift truck into a cargo aircraft; and a demonstration of the Clark Hi-Lo Stack "double-duty" fork-lift truck device that per-



Imagination has spread the time- and cost-cutting benefits of Wheelabrator airless blast cleaning to many fields and operations. For example, Wheelabrators are used to deflash molded plastic parts, descale steel sheet and strip, remove sand and scale from castings, forgings and heat treated work, process grinding wheels, etc. The Wheelabrator principle of airless abrasive blasting plus free-running imagination can perhaps make big, new savings in a new field for you.

For more details on the Wheelabrator, write today for Bulletin 74C.

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LUMBER CRAYONS

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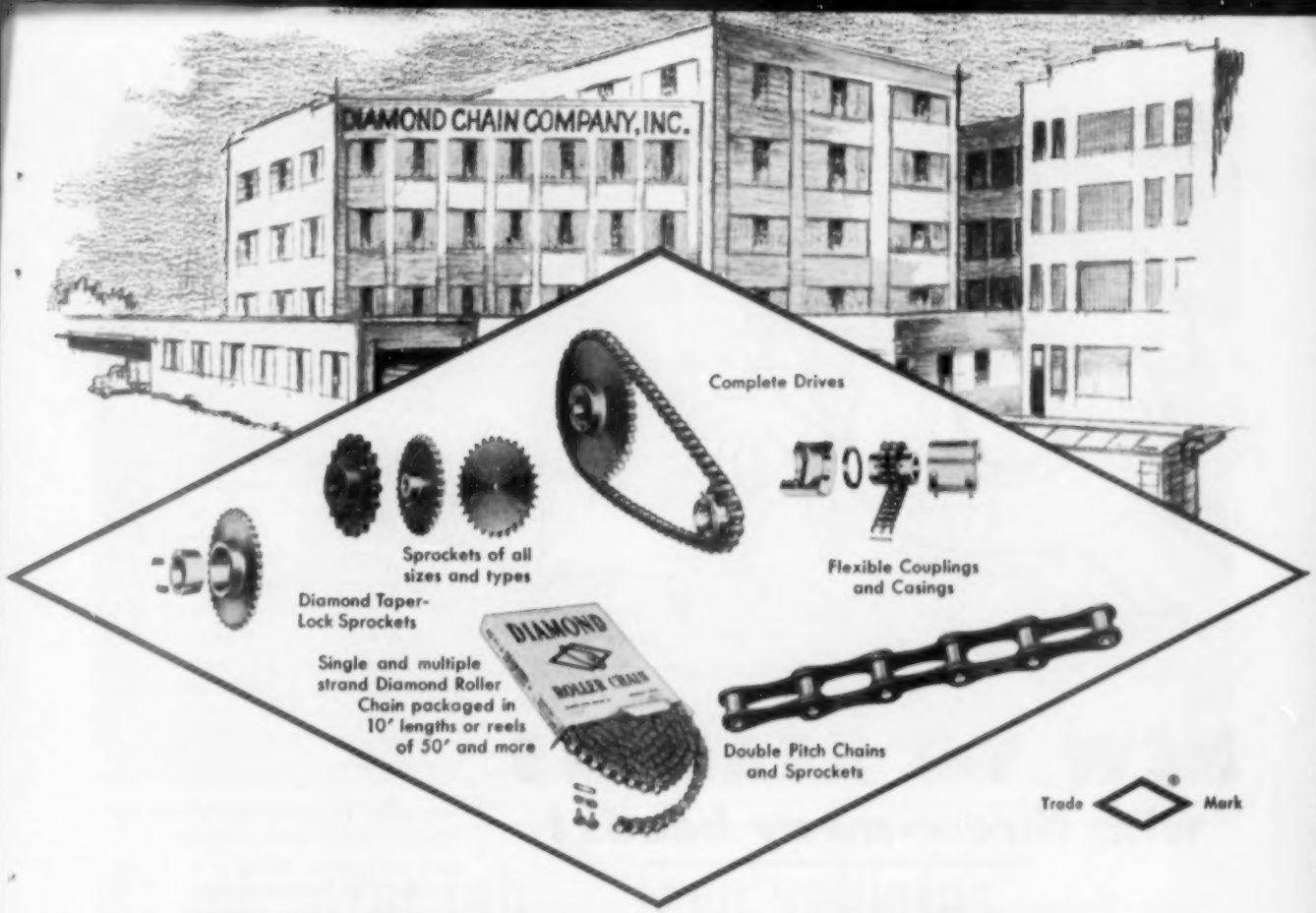
ON GUARD!

New Manual Tells How to get MORE value in CHAIN LINK FENCE

You want long life, low upkeep, fine appearance when you erect chain link fence. This book tells what to look for, describes 14 points of superiority of Continental Chain Link Fence—why it has greater tensile strength, increased rust resistance. Contains complete specifications. Write today for free copy.

CONTINENTAL
STEEL CORPORATION · KOKOMO, INDIANA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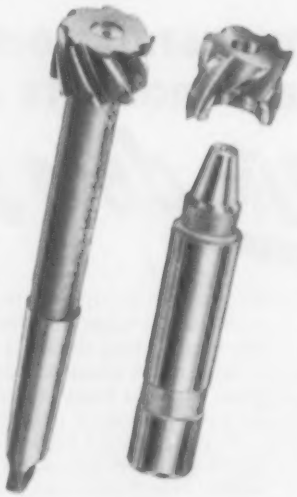
*Now they call Joe a genius**

*He's no Einstein — but he figured how to cut costs in half by switching to . . .

NEW T-J REAMERS
with *throw-away heads!*

You don't have to be a wizard at figures to see how the new T-J Reamer with Throw-Away Head cuts your replacement costs to *less than half*. You *save* because you replace *only* the part that wears out. Buy original shank . . . change the head in a jiffy when worn. Wide range of head sizes from ½" to 2¾" inclusive, in 1/16" increments available with right or left hand spiral flutes for thru or blind hole reaming.

Tapered hole in head insures concentricity and *new* thread design assures a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking due to cutting portion wearing undersize and creating negative relief. It's a product of T-J's 39 years of know-how as one of the largest manufacturers of die sinking milling cutters. Tomkins-Johnson Co., 617 North Mechanic St., Jackson, Mich.



Left hand spiral, right hand cut. Right hand spiral, right hand cut.

1—Cuts replacement cost to less than half!
2—Quick change of heads saves time.
3—Easy to change heads for different metals, increases efficiency.
4—Head and arbor firmly locked together.
5—Wide range of sizes.

★Exclusive, high potential territories open to responsible manufacturers representatives. Write today!

T-J TOMKINS-JOHNSON

mits 62 inches of "free-lift" for tiering in carriers, passage under low overhead clearance, and 130-in. lift for warehousing. Machines shown are industrial fork-lift trucks and towing tractors. 16mm, color, sound, 12 min.

Clark Equipment Co., Battle Creek, Mich.

Materials Handling Newsreel, Issue No. 4. Diversified modern materials handling methods and equipment in six installations: Includes a large building supplies yard, small stone yard, bottling plant, wholesale grocery, banana distribution house, and the plant of the world's largest manufacturer of soft elastic gelatin capsules. 16mm, black and white, sound, 20 min.

Clark Equipment Co., Battle Creek, Mich.

Materials Handling Newsreel, Issue No. 1. Mechanized handling methods in various industries: Towing tractor moving unfinished and finished electric street railway cars at point of manufacture; unit-load handling by fork-lift trucks during river-barge loading and oceanship loading operations; Yardlift fork-lift trucks, especially designed for outdoor operations, handling material in the yards of a manufacturing plant and in brick and concrete block plants; 4000-lb-capacity fork-lift truck, equipped with mechanical forks, operating in a large brick plant. 16mm, black and white, sound, 29 min.

Clark Equipment Co., Battle Creek, Mich.

Modern Materials Handling Methods. (Some obsolete equipment is shown, but because methods are basic many requests are received for this film. A limited number of prints are available.) Shows proper methods of breaking out boxcars, loading pallets; correct fork-lift truck handling methods in loading, unloading and warehousing; advantages of mechanized handling over individual and hand-truck methods. 16mm, black and white, sound, 17 min.

Clark Equipment Co., Battle Creek, Mich.

Turn the page

Mobile power. With power take-off, the 4-wheel drive Universal 'Jeep' operates welders, generators, compressors, and many other types of industrial equipment. It can also be equipped with mowers, snow plows, grader or dozer blades or a trencher.

On job after job... 'Jeep' vehicles save you time and money!

Hauling. With the extra traction of its 4-wheel drive, and a special low gear range when needed, the Universal 'Jeep' hauls heavily loaded trailers around the factory yard or inside factory buildings.

Yard maintenance. The 4-wheel drive 'Jeep' Truck carries loads over a ton, tows trailers many times its own weight, and with power take-off operates a wide variety of industrial equipment.

"Go-anywhere" 4-wheel drive 'Jeep' family vehicles spread their cost over a wide variety of factory jobs, from carrying repair parts to supplying transportation around the plant or between plants. They travel in conventional 2-wheel drive on hard, smooth surfaces, and shift easily into 4-wheel drive when the going is tough, on or off the road.

With their low initial cost, low maintenance and long life, versatile vehicles in the 'Jeep' family can save you money in almost any industrial operation. It will pay you to write for information or get the facts from your Willys dealer.

The 'Jeep' family of 4-wheel drive vehicles

WILLYS... makers of the world's most useful vehicles

WILLYS MOTORS, INC., TOLEDO 1, OHIO

V-BELTING BY THE MILE!
Fasteners by ALLIGATOR

✓ Open-End V-Belting (in rolls) is now supplied by all major V-Belt manufacturers.

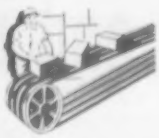
✓ Improved **ALLIGATOR V-BELT FASTENERS** are recommended by all manufacturers of Open-End V-Belting (in rolls).

Need a 23′—3½″ Long V-Belt?

. . . or one a mile long? Alligator Fastened V-Belts can be made up any length to fit any drive.

Convey with V-Belts?

With Alligator Fastened V-Belts you can make up conveyors any width, any length.



Got a shaft you want to go around?

Alligator Fastened V-Belts will do it. No need to dismantle anything.

Fixed centers—no means of take-up

Alligator Fasteners solve this problem!

The above represent but a few of "V-Belt Applications *Unlimited*" — do they give you any ideas?

Write for information.

Ask for Bulletin V-219

FLEXIBLE STEEL LACING CO.
4678 Lexington St. Chicago 44, Ill.

ALLIGATOR
V-BELT FASTENERS

Begins on page 326

Clark Modern Materials Handling Methods. World War II film, for the instruction of operators in Air Force depots. Some methods and much of the equipment shown are obsolete, but owing to continued demand for a basic materials handling film, limited number of prints remain available. Various handling operations pertaining to boxcar loading and unloading and warehousing; and the proper use of industrial trucks and tractors as outlined by Air Force engineers are shown. 16mm, black and white, sound, 23 min.

Clark Equipment Co., Battle Creek, Mich.

Powered Industrial Trucks. The film deals with different types of powered industrial trucks and their uses. 16mm, black and white, sound, 27 min. Available at $2.50 rental fee from:

Director of Audio-Visual Services, University of Southern California, Los Angeles 7.

Also available for purchase ($90) from:

Ideal Pictures, 58 East South Water, Chicago 1, or 233-239 West 42nd St., New York 36.

You Be the Arbitrator

Begins on page 148

THE AWARD: The company won. Said the arbitrator: "An employee is not relieved of reasonable diligence in the performance of his assigned work because another employee is charged with some related responsibility in the same operation."

CAUTION: *The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.*

"WHAT?"

"FAR-AIR FILTERS PAY FOR THEMSELVES IN 18 MONTHS?"

"Yes, sir. Many users report FAR-AIR filters save 75% of their original cost every year, too!"

"How come?"

"For one reason, they handle 50% more air than 'bargain brands', so it takes ⅓ fewer filters to do the job."

"Yes, but they cost more."

"True, but you only buy them once — not over and over."

"It costs money to clean them."

". . . but they hold 50% more dirt, last longer between cleanings and clean easier, so maintenance cost is 'way down."

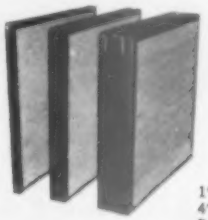
"In fact, FAR-AIR filters will save you enough over 'cheap brands' to pay for your original filter investment many times over."

"You prove that and I'll buy!"

"Yes sir, we'll start a test in your plant tomorrow."

If you would like a demonstration of FAR-AIR savings in *your* plant under *your* operating conditions, write or wire for a free evaluation test.

You'll be glad you did!



1", 2" and 4" Thick Panel Filters

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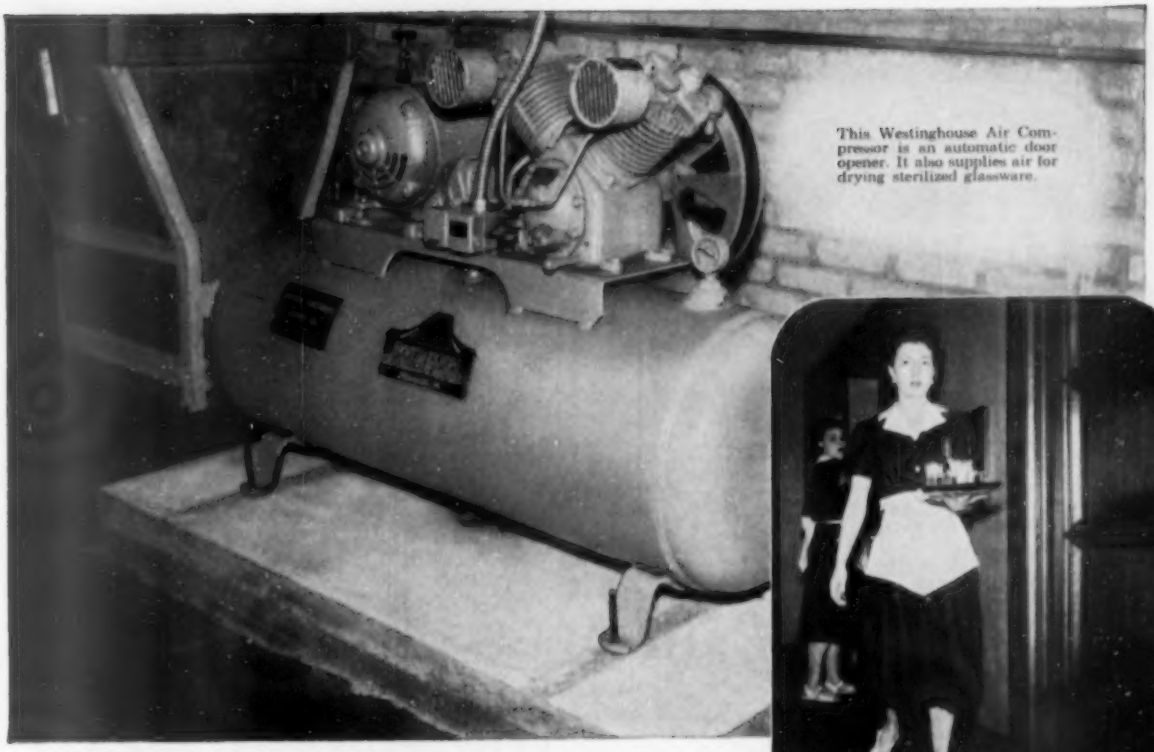

This Westinghouse Air Compressor is an automatic door opener. It also supplies air for drying sterilized glassware.

Open Sesame

...the magic flexibility of air power supplied by Westinghouse Air Compressors, opens the door to greater efficiency, lower costs

The usefulness of compressed air is little short of amazing. It opens doors, inflates tires, paints equipment, runs punch presses, operates hoists and myriads of pneumatic tools that multiply a worker's productivity.

There are many more uses, but they all add up to lower costs. That's why the source of your air power is so important. It must be dependable to produce maximum savings — it should be a Westinghouse Compressor. Here are a few reasons why:

Low oil-level protection — your Westinghouse won't pump air if the oil-level or oil pressure is too low. You never get repair bills for lack of lubrication.

Automotive-type lubrication — constant pressure principle forces oil to every moving part for longer life.

Single- and two-stage, air-cooled design — provide air at maximum efficiency. Cost less to operate.

Starting unloader — keeps compressor unloaded until motor reaches normal speed and oil circulation starts.

Thermal overload protection — cuts current if motor should overheat or if line voltage should drop.

Open the door to lower costs with dependable air power. Insist on Westinghouse Air Compressors in your plant. Sizes up to 40 hp. Write for latest literature.

W-104

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

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You don't have to shop around . . . AL Stainless Steel is produced in every form you may need

You ought to have a copy of our PUBLICATION LIST

This 8-page bulletin lists and describes all the current publications on the principal families of A-L Products: stainless and heat-resisting steels, tool and die steels, electrical steels and alloys, permanent magnet materials, and Carmet carbides. There is a handy order form for your convenience in getting the material you need: technical and fabricating data, information on applications and fields of utility, etc. *Write for your copy.*

ADDRESS DEPT. F-83

WHATEVER your stainless steel requirements may be, you can satisfy them with AL Stainless.

It's produced in any grade, form or finish you want—from the finest wire to heavy plates, castings and forgings, including sheets, strip, bars, shapes, tubes —*everything!*

That's not only handy, but advantageous: one reliable source, one undivided responsibility, one well-known standard of quality and uniformity.

Complete technical and fabricating data —engineering help, too—are yours for the asking. Just keep it in mind to specify "AL Stainless Steel" when you're in the market. And remember, wherever you use it, this time-tested stainless steel looks better, lasts longer, usually works out to cost you less in the long run. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

For Stainless Steel in ALL Forms—call

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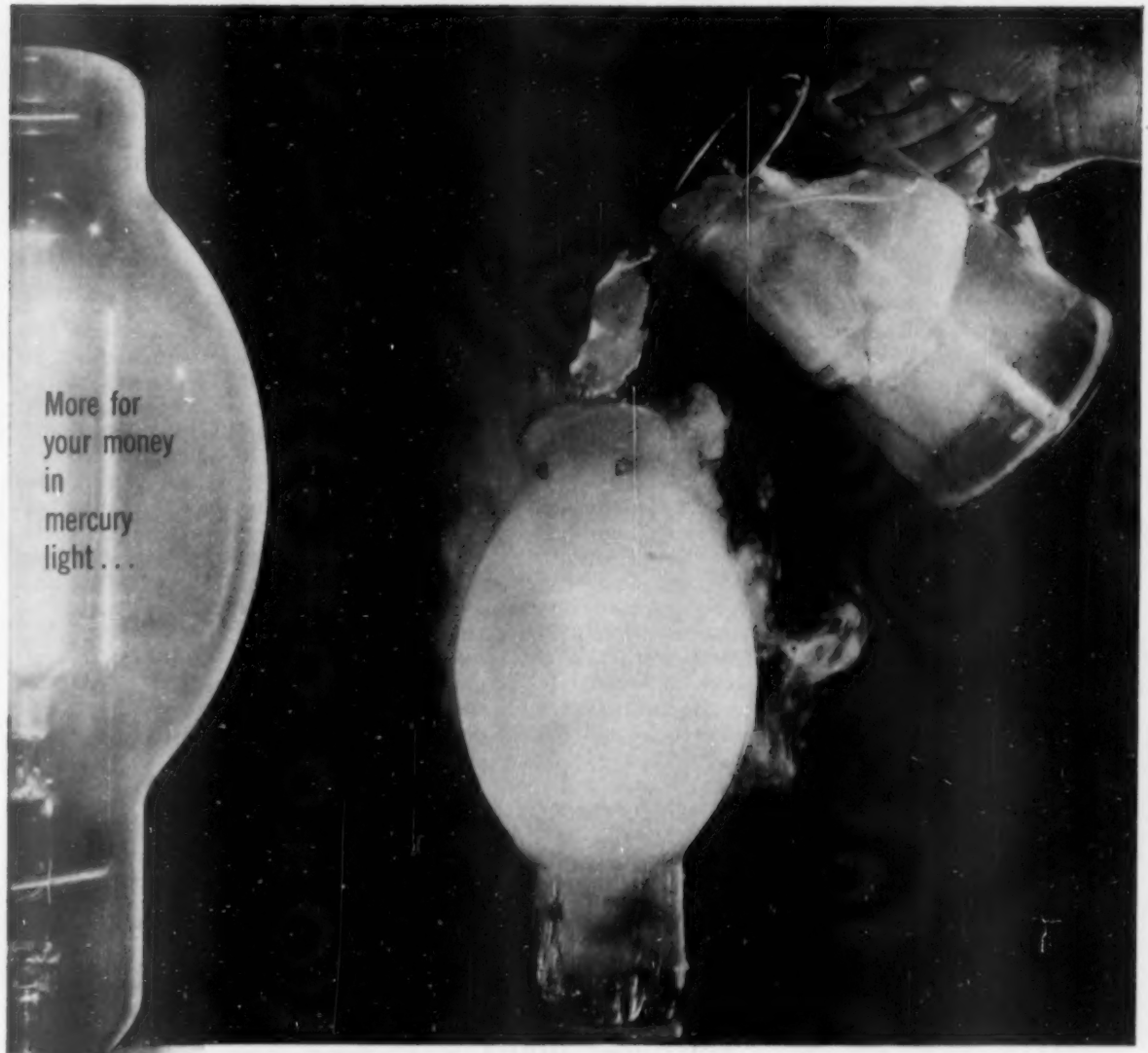
AL STAINLESS STEEL

WSW 6009 **Warehouse stocks carried by all Ryerson Steel plants**



ANNOUNCING NEW WESTINGHOUSE WEATHER DUTY(TM) MERCURY LAMPS

Down again go your lighting costs as Westinghouse announces another basic improvement in high-intensity mercury lamps. It's the world's first line of *weather-resistant*, heavy-duty mercury lamps.

Made with hard, tough, thermally stable glass, new Westinghouse WEATHER DUTY Mercury Lamps can be burned outdoors unprotected in rain, snow or sleet with no risk of cracking. And they can be burned indoors in ventilated fixtures with no danger of shattering under water drops entering through the ventilating openings. Moreover, they are highly resistant to mechanical breakage and to the corrosive effect of industrial fumes.

Thus in any type of installation—indoor or outdoor—Westinghouse WEATHER DUTY Mercury Lamps save you money three new ways. First, by eliminating the need for protective shields and permitting the use of cheaper fixtures. Second, by doing away with costly shield maintenance. And third, by releasing the large amount of light wasted by dirty shields.

WEATHER DUTY Mercury Lamps are the latest example of how Westinghouse gives you *"more for your money in mercury light."* Now available types E-H1-WD, J-H1-WD, A-H12-WD, C-H12-WD, A-H15-WD and B-H15-WD.

WESTINGHOUSE GUARANTEES the service life of all its widely used types of quartz mercury lamps. For full details call your Westinghouse Lamp Representative—or write Westinghouse Lamp Div., Dept. FM-11, Bloomfield, N. J. "You can be sure if it's Westinghouse."

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU***

instituting a reduced work week prematurely we could so upset the balance of our economy that the goal of a 4-day week might be indefinitely postponed.

Objectives of technological progress are, in the last analysis, social objectives. Through expanding economy and ever-increasing productivity we will improve living standards across the country and achieve more equitable distribution of the benefits of our economic system. One of the most obvious of those benefits would be more leisure time to devote to our families, our homes, and all of the pleasant things life has to offer. A shorter work week accompanied by rising productivity will also tend to increase consumption, thus reinforcing the basis for an expanding national economy.

"Worthwhile objective, spells progress"

PHILIP B. HOFMANN
Vice Chairman of the Board
Johnson & Johnson

Today's discussions on a 4-day week are in the same category as discussions in the past when a 6-day week was common and the American economy moved into a 5-day week. It is not impossible and will come in time. It will have to come through increased efficiency and productivity so there is no decline in purchasing power to maintain mass consumption. It must come through industrial evolution and its appearance will obviously vary by industries. It is a worthwhile objective for both management and labor since it spells progress.

"Workers holding down two jobs"

DON F. COPELL
Vice President, Wagner Baking Corp.

Since it will take approximately 10- to 12-million more workers to get the job done on a 4-day work week, I do not think it will be either feasible or practical for the next five to ten years.

Automation will not replace as many workers as most people believe, nor will automatic equipment be installed fast enough to cause any serious unemployment.

The greatest dangers are the possibility of workers holding down two jobs, and the inability of most workers effectively to use and enjoy their additional leisure time.

"Economically adverse to cut hours"

HENDERSON SUPPLEE, JR.
President, The Atlantic Refining Co.

It has required about 25 years for a decline of eight hours to the present widely observed 40-hour week. While a severe economic decline could accelerate a further drop, it must be realized that military emergencies could have an opposite effect. Furthermore, experts inform us that population age weighting can be expected to cause short labor supply for at least five or six more years. Certainly it would be economically adverse to cut hours and increase inflationary pressures in a period of tight labor supply

Except for the fact that most of us would prefer not to have to work at all, there does not appear to be a present justification for a 4-day week.

"Currently under study and review"

JOHN S. COLEMAN
President, U. S. Chamber of Commerce

The Chamber of Commerce of the United States has not taken any formal position on the 4-day work week as such. The question is currently under intensive study and review. Naturally, we would want to look carefully at considerations of cost, potential competitive consequences, and alternative forms in which the shorter work week proposal has been advanced.

May I commend FACTORY for its alertness in undertaking a study of this new question at this time. I can assure you that the staff of the National Chamber will find the results useful for our own research on this subject.

"Apt to get into too much mischief?"

PHIL CARROLL
Professional Engineer

The prospects of a 4-day week worry me for three reasons: First, as one of the so-called self-employed, I fear the further devaluation of our savings should we have another "52-40 deal" and pay five days' wages for four days' work. Second, I can't see far enough ahead to understand how we can support all the too young and the pensioned folks with the remaining work-hours. Third, I wonder if we are right in doing only two-thirds of the "six days shalt thou labor." Aren't we apt to get into too much mischief?

"The specter of shifts in employment"

J. W. BARKER
President, ASME

When, if at all, the 4-day work week will become *possible*, depends on many independent variables. When it will, if at all, become *feasible*, depends on many other and independent variables, most non-scientific in nature, some conflicting with those for "possibility."

For instance, *complete* automation of *all* mass production lines in industry might make it *possible* for industry to mass-produce the *present output* on a 4-day work week for *those operating the automated lines*. However, automation has *not* been worked out for *all* types of mass production, nor have the necessary economic studies been made to prove whether or not such extensions of automation would produce at the same or lower ultimate costs. Nor have the necessary *financial* studies been made to determine whether or not the huge capital requirements for anything approaching complete automation could be met without a tremendous financial upset.

Even assuming that these variables (and others not mentioned) could be met, the question of "feasibility" raises the spectre of "shifts in employment" for huge numbers of our working population. Auto-

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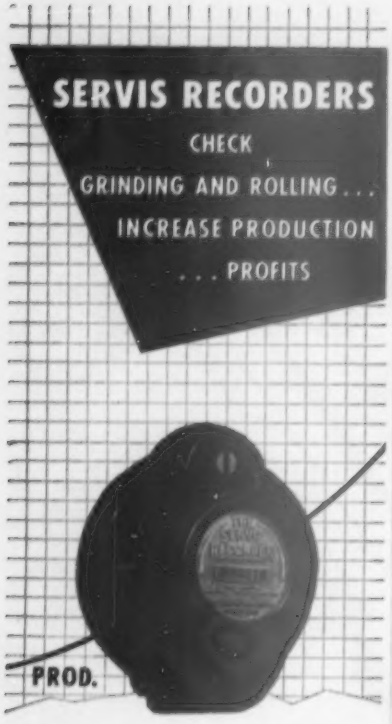

Typical of many Servis Recorder users is the leading paint manufacturer who first used Servis Recorders to cut costs of highway trucks and now has 25 Servis Recorders solving two problems . . . quality control and production.

Ball mills and pigment rollers, unless run the "proper" time, jeopardize quality and send production costs soaring. Now Mechanical Servis Recorders accurately record running time and down time in these two departments on easily read, permanent charts. Result . . . production costs are down.

"Production has increased and quality is controlled easier because men are much more conscious of grinding and batching times," says an executive of the paint firm.

If you have problems involving busy and idle time on machinery, motor trucks or industrial trucks, write us today. We have a booklet describing how Servis Recorders can help you in each field.

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HOW KEY MEN VIEW THE 4-DAY WEEK
Begins on page 91

mation requires large numbers of highly skilled and uses fewer unskilled operating personnel. What would happen to those unskilled workers who could not be retrained for higher skills? And what would such an upgrading of workers involve in the way of a vocational education program?

Last but by no means least, what would be the repercussions on our "balance of trade" in the work markets? And what would be the internal repercussions on recreational, amusement, spiritual, and educational activities were 66-million presently gainfully employed released for one more day per week?

Such problems can be met only gradually *over a considerable period of years of readjustment* in our "American way of life" possibly without reducing our constantly rising "American standard of living." But if a catastrope is to be avoided, evolution not revolution can be the only answer.

Since I have had no opportunity to consult with my colleagues of the ASME, the above must be accepted only as my personal views.

"Prefer a 5-day 30-hour work week"

KARL F. FELLER
International President, International Union of United Brewery, Flour, Cereal, Soft Drink, and Distillery Workers

First of all, we feel the 4-day work week is adaptable, suitable, and feasible for certain industries and the labor unions holding respective jurisdiction in those industries, such as auto, electrical appliance manufacturers, textile, the garment industry, to name a few.

Our organization prefers a 5-day, 6-hour day, work week for a total of 30 hours, inasmuch as it will allow the industry to utilize 24-hour plant operation. The plan is feasible now. It is necessary now. The advent of electronics and stepped-up technological progress in mass production methods make this necessary immediately.

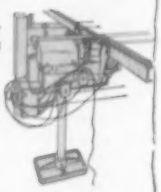
Turn the page

MM

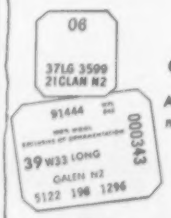
MARKEM
solved these marking problems

marking rigid electrical conduit

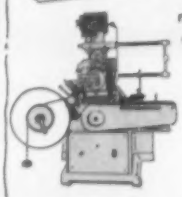
Manufacturer had used decals and labels to identify conduit and tubing, but wanted a more permanent, efficient method. A Markem Model 86A machine now marks ten foot lengths of conduit at production rates, with maker's name, trademark, U. L. issue number and other detail.



printing clothing tickets



A new garment ticketing method using a Markem 126C machine has reduced labor, time and trouble for a leading clothing manufacturer. "Jokers" are eliminated — one ticket now replaces two — and the 126 automatically prints tickets in 2 colors, cuts off, stacks and counts them.

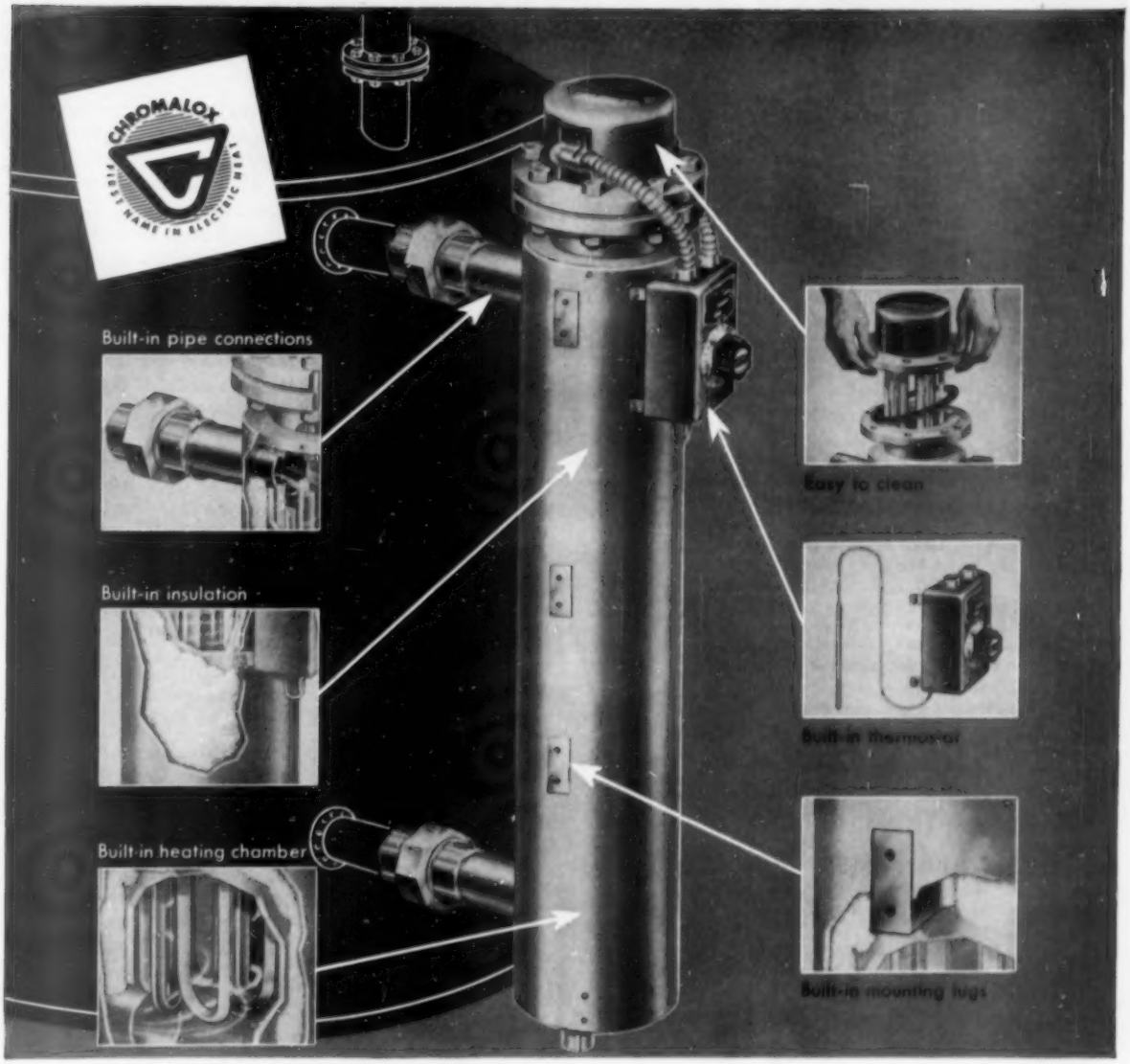


marking vacuum tubes

Tubes are now marked with manufacturer's name, trademark, type, etc., as fast as 7000 per hour, on efficent Markem 20A machines. Interchangeable, calibrated, adjustable chutes accept miniature to large sizes, and special Markem marking compounds assure clear, durable prints on glass and metal.

Modern marking, that matches today's production and marketing needs, is Markem's business. Make your mark *better* by calling Markem Machine Co., Keene 18, N. H.

MARKEM ...TO MAKE YOUR MARK



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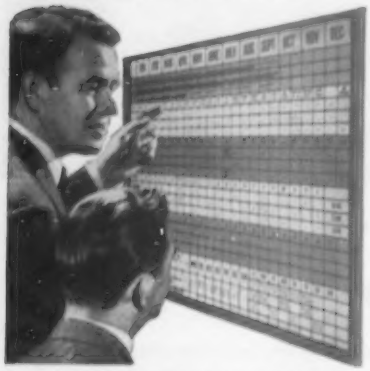

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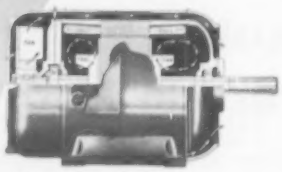

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HOW KEY MEN VIEW THE 4-DAY WEEK
Begins on page 91

In our particular industries we have no raw-material supply problem or finished-product warehouse problem. The objection to the plan by management naturally will be on the costs. However, such objection is groundless inasmuch as efficiency of operation and tremendously increased productivity will more than offset the cost.

Organized labor will favor its acceptance, since in many segments of industry we already have less than a 40-hour work week. There are 37½- and 35-hour work weeks, and even 32 and 30-hour work weeks, with sufficient time for relief of either 10 or 15 minutes in the morning and afternoon, plus 20-minute and a half-hour paid lunch periods which, even on an 8-hour basis, reduces the net working day considerably.

Notes on table, page 84

DEFINITIONS:

Productivity is output per man-hour in the private economy. (National income in 1950 dollars divided by man-hours worked by all persons other than government employees.)

Standard of living is private consumption of goods and services (including savings) per capita. (National income in 1950 dollars divided by population.)

Weekly hours of work is for all workers, including agricultural and self-employed. (Production workers in manufacturing—figures available only since 1909—worked fewer hours up to about 1940, same or slightly more since then.)

SOURCES:

U. S. Dept. of Commerce; Bureau of Labor Statistics; "America's Needs and Resources" (Twentieth Century Fund). 1955 figures are estimates by FACTORY.

* * *

A combined reprint of the two articles on the 4-day week (p. 84 and p. 91) is available at 50¢ per copy. Write: The Editor, FACTORY, 330 West 42nd St., New York 36, N. Y.

THE NEW HYSTER 20 GETS MORE WORK DONE PER DAY THAN ANY OTHER

2000-LB CAPACITY PNEUMATIC

Briefly, here is why you should *look further* into the Hyster 20. Like all Hyster Lift Trucks, the 20 is designed by men who have had long experience in the manufacture of materials handling machinery, aided by Henry Dreyfuss, noted industrial designer. The result is a truck with an *unusual capacity* to get more work done per day.

Operator can better see what he is doing and can maneuver in greater confidence *inside*, and *outside*, under all operating conditions, and in closest quarters.

Less time is spent in servicing and repair because the Hyster 20 is *designed* for more time on the job. We can't possibly begin to tell you all you should know about this truck—but call your Hyster Dealer. He will give you the entire story. If you move materials of any sort, you owe it to yourself to look into the very definite advantages of using the new Hyster 20 Lift Truck, or any of the other Hyster Industrial Trucks 1,000 to 30,000 lbs. capacity.

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Available with Monomast Upright and L-P Gas operation

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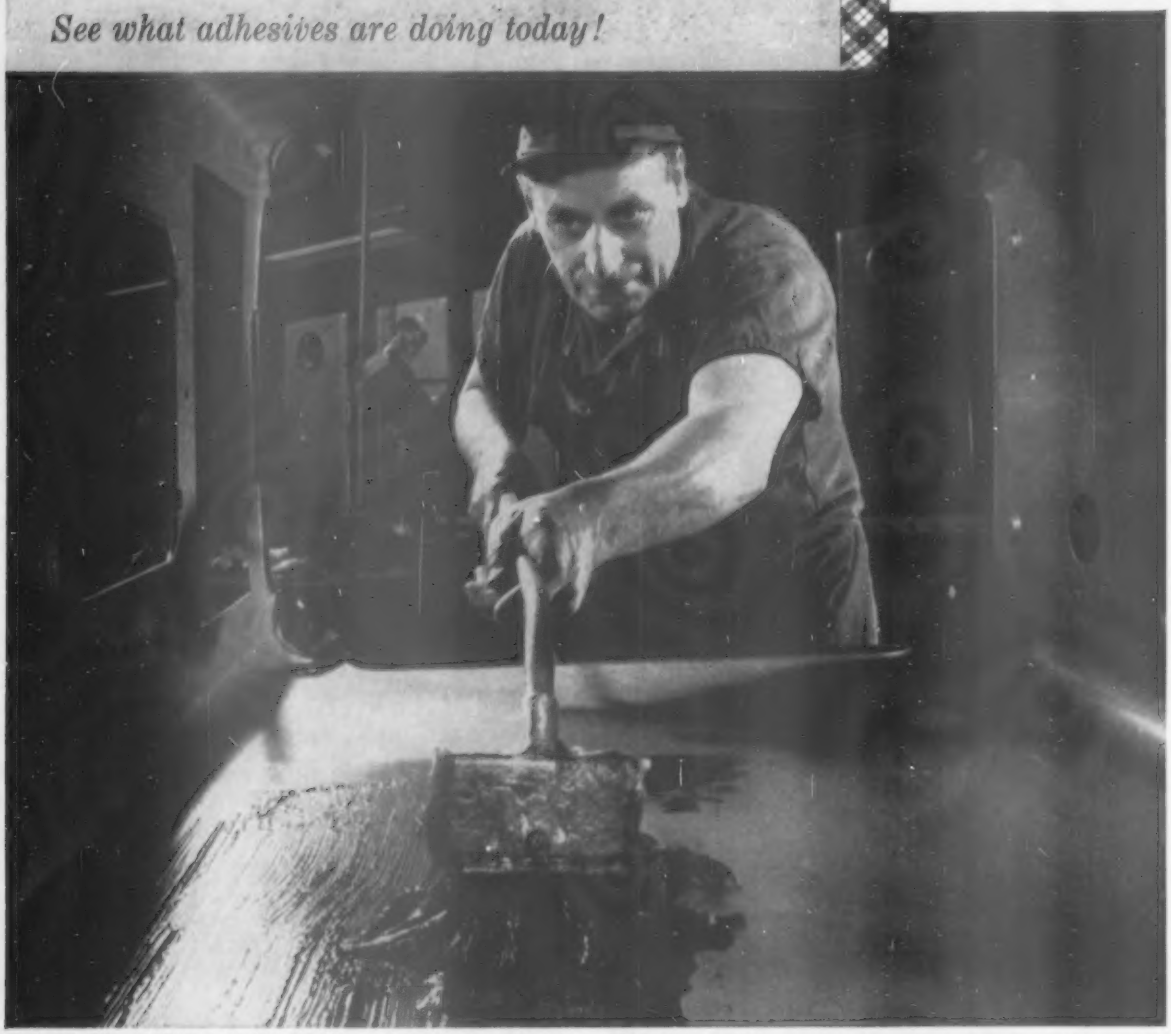

OUT OF THIS WORKER'S BRUSH FLOWS A MODERN FASTENER THAT HELPS BUILD BETTER INCINERATORS. IT'S A RUGGED 3M ADHESIVE.

Setting a tougher trap for heat

It's got to be hot—up to 350°F.—inside this incinerator outer cabinet, so that even *wet* refuse will burn.

To hold the temperature, heat must be kept steadily on the job. A 3M adhesive, EC-321, does it by fastening fibrous glass insulation for keeps inside the cabinet. Trapped, the heat stays hard at work, does the job.

But EC-321 does more than just guard incinerator efficiency. It helps build them more durably, more economically, too. It eliminates the hot spots, weld marks and half the labor of former methods.

Since switching to 3M Brand adhesive, the product engineer hasn't had one complaint of adhesive failure.

Hundreds of other 3M adhesives serve industry in a thousand varied uses.

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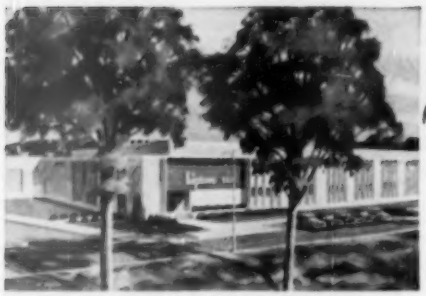

Thomas J. Lipton, Inc., Suffolk, Va. Architect and engineer: R. W. Noel, Architect-Engineers, Jackson, Miss.

1956 Award Winners, FACTORY Magazine

Sylvania Electric Products Inc., St. Marys, Pa. Architect and engineer: Sylvania Facilities Planning Office, Williamsport, Pa. Paul H. Van Wart, AIA, Architect

General Electric Company, Bloomington, Ill. Architect and engineer: Vern E. Alden Company, Chicago

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Briggs & Stratton Corp., Milwaukee, Wis. Architect and engineer: F. A. Fairbrother and Geo. H. Miehls. Albert Kahn Associated Architects & Engineers, consultants

Parker-Kalon Division, General American Transportation Corp., Clifton, N. J. Engineers and builders: Walter Kidde Constructors, Inc., New York City and Houston

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Sikorsky Aircraft, Division of United Aircraft Corporation, Stratford, Conn. Architect and engineer: F. A. Fairbrother and Geo. H. Miehls, Albert Kahn Assoc. Architects & Engineers

P. Lorillard Company, Greensboro, N. C. Architect and engineer: Lockwood Greene Engineers Inc., New York City

The Ebco Manufacturing Company, Columbus, Ohio. Architect: Merle Robert Maffit, Columbus. Engineer and builder: F & Y Building Service, Inc., Columbus

Eight of the Nine Winning Manufacturing Plants are Equipped with Bradley Washfountains

In the April issue of *Factory Management & Maintenance*, nine Award Winning *manufacturing* plants were shown. It is significant that the washrooms of eight of these fine plants are equipped with modern sanitary Bradley Washfountains.

A few comments made concerning these plants:— "Best in manufacturing service, employees' facilities, etc."; "Equipped with top service for both operation and workers"; "Plant services adequate, and employees work in safe, comfortable surroundings"; "New high in plant protection and employee comfort"; "Equipped with best in employee facilities".

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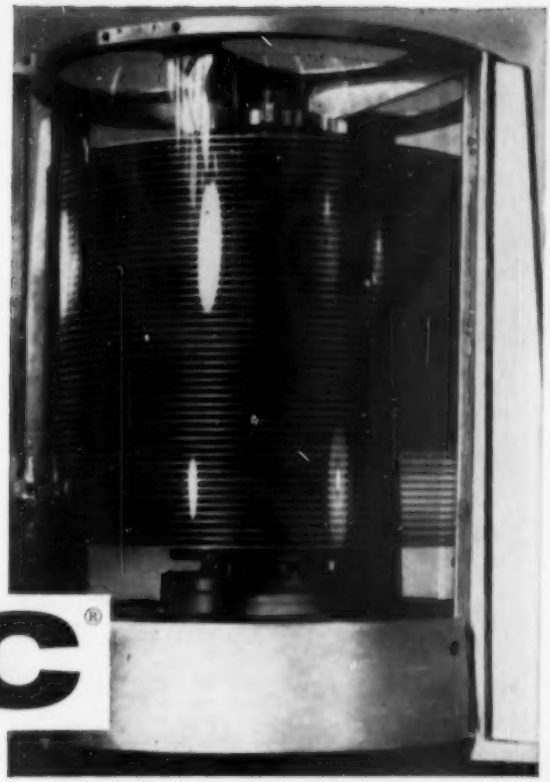

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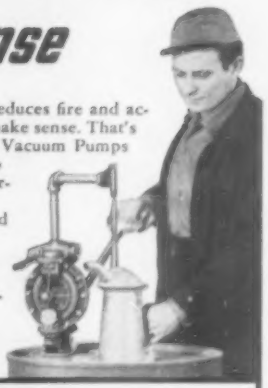

Any plant improvement that reduces fire and accident hazards certainly does make sense. That's the case when Tokheim High Vacuum Pumps are put into service. They help prevent spilling, slopping, overfilling and dripping. Operate on both forward and backward strokes—deliver 20 gallons per 100 strokes. Available with hose or spout outlets and other optional attachments.

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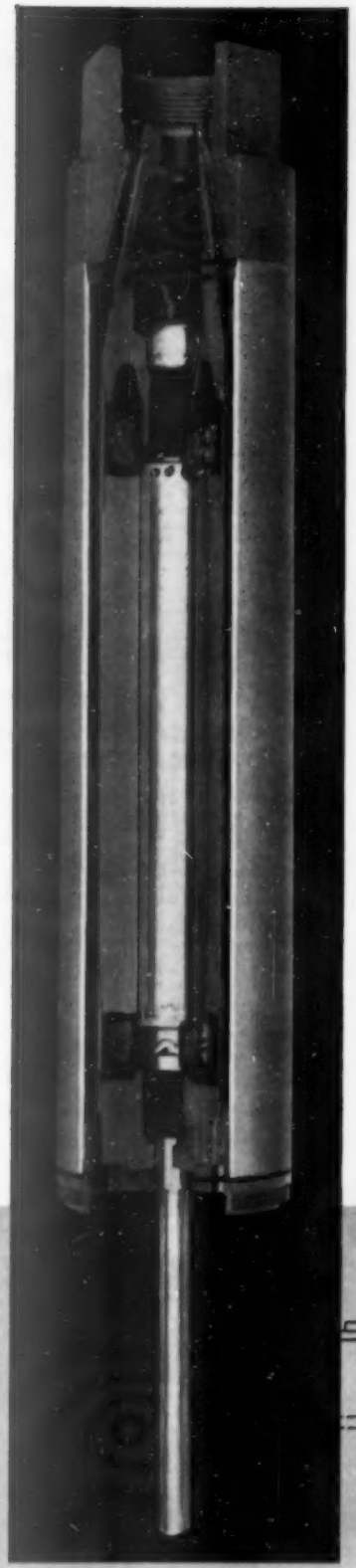

7 "bonus values" of Leland's submersible motor!

Now both motor and pump can be installed right in your gasoline storage tank! Even with high octane gasolines, the new Leland explosion-proof motor eliminates vapor-lock . . . uses the gasoline itself for lubrication and cooling. This completely new ¾ hp, 230v AC thermally protected motor measures only 3½ inches in diameter . . . fits into existing tanks. It's fully U.L. Approved for Class I, Group D service.

Simple and rugged, built for long-life economy, this new Leland submersible pump motor has these 7 big advantages over other motors:

1. Completely self-contained unit includes outer shell necessary for gasoline passage – makes expensive extras unnecessary.
2. Extruded aluminum outer shell becomes main structural member – ribbed design provides much needed rigidity.
3. 9/16" chrome-steel shaft extension provides greater strength–prevents mechanical distortion.
4. Increased annular area allows 10% greater gasoline flow – minimizes trouble-making back pressure and turbulence.
5. Suction stub mounts without adaptor castings – reduces expense required with other motors.
6. Plastic-impregnated windings surpass wet-design insulation requirements – remain trouble-free for extra-long service life.
7. Leland's integrated motor design permits complete removal of pump or stub *without* disassembling motor.

In addition . . . a remote-control box is supplied with each Leland submersible pump motor. Includes thermal overload protector, line control and starting relays, starting and running capacitors.

30 years ago Leland developed the first gasoline curb pump motor to receive U.L. Approval – today, Leland gasoline pump motors outsell all others combined. So there's good reason why, for explosion-proof motors of any kind, your best bet is Leland. If you would like more information, and/or a copy of a new brochure on the submersible motor, write, wire or phone us –TODAY!

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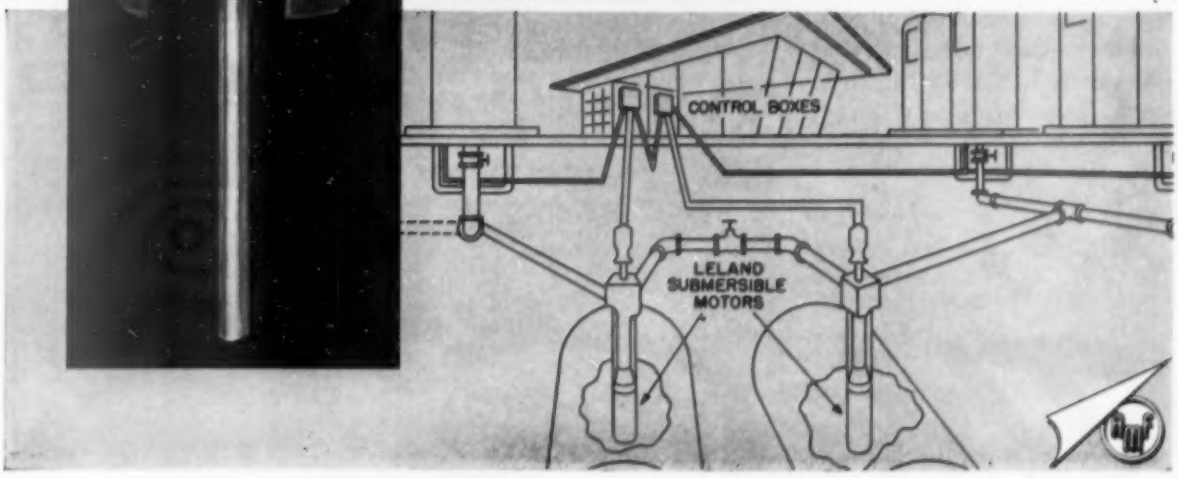

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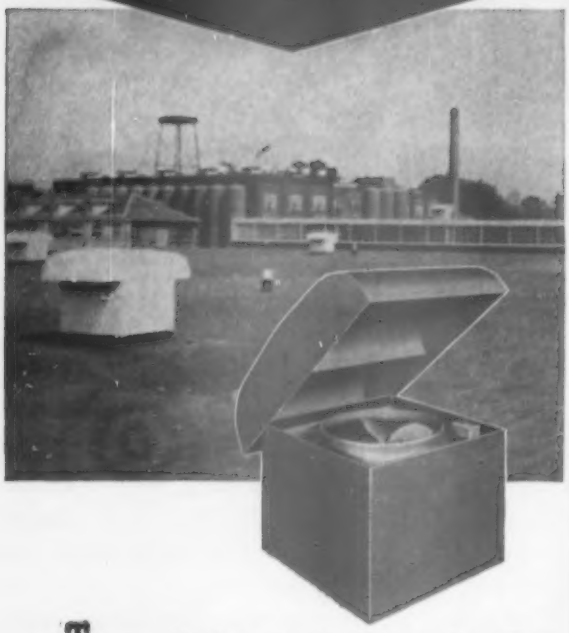

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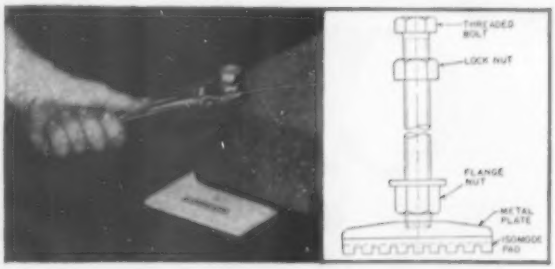

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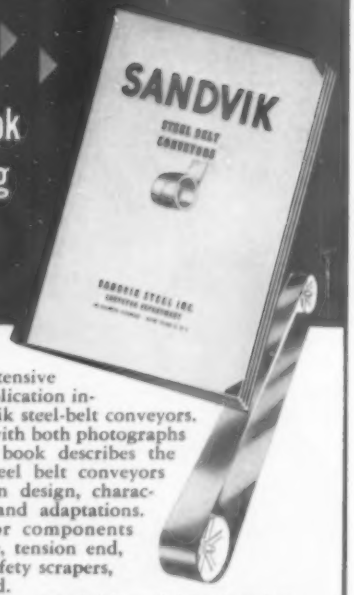

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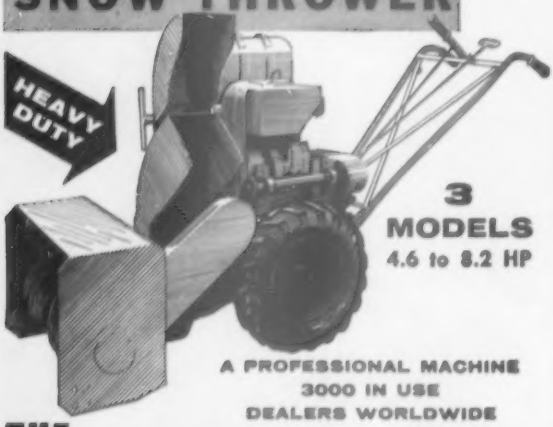

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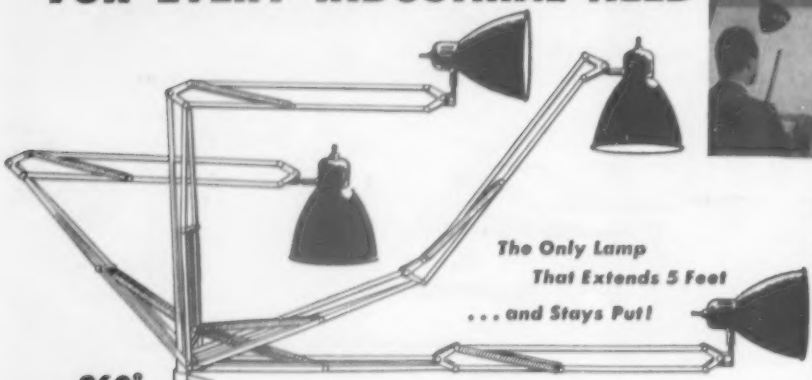

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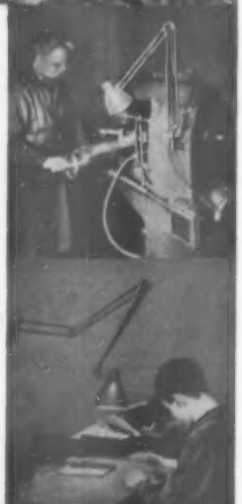

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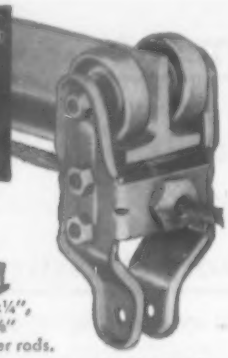

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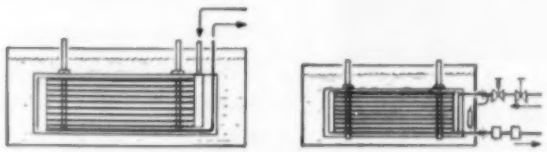

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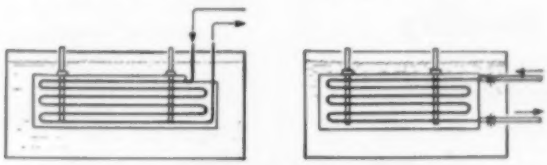

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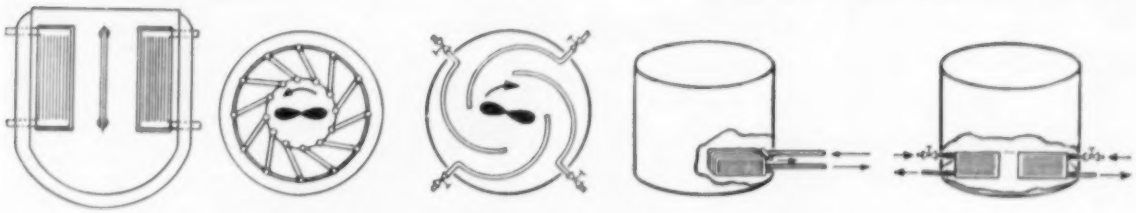

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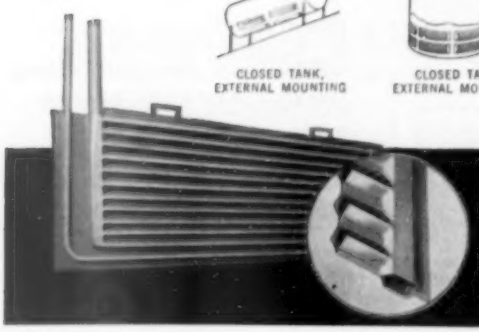

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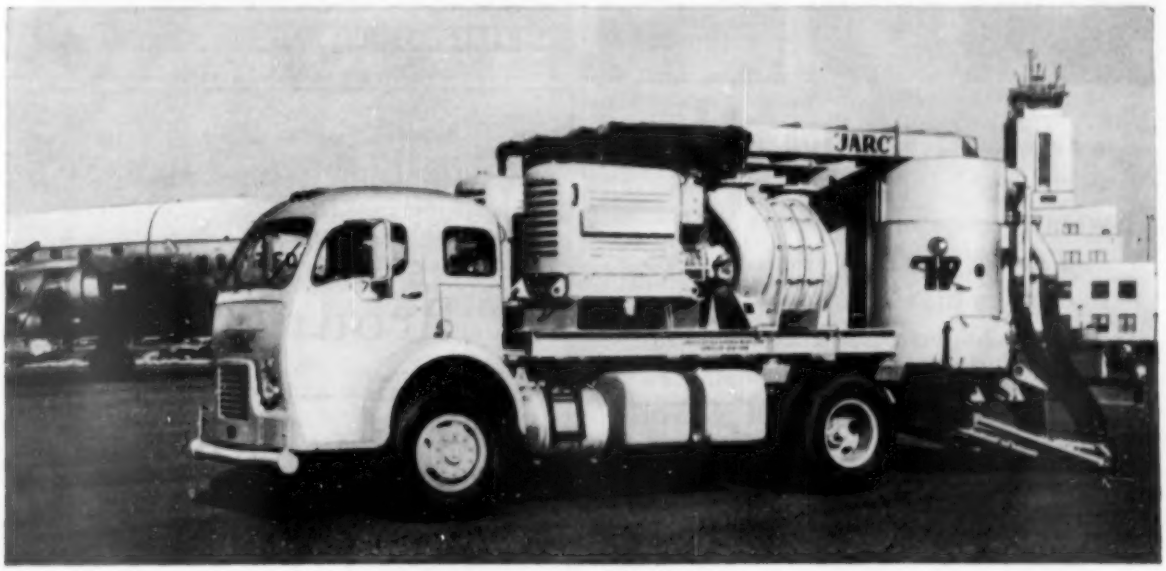

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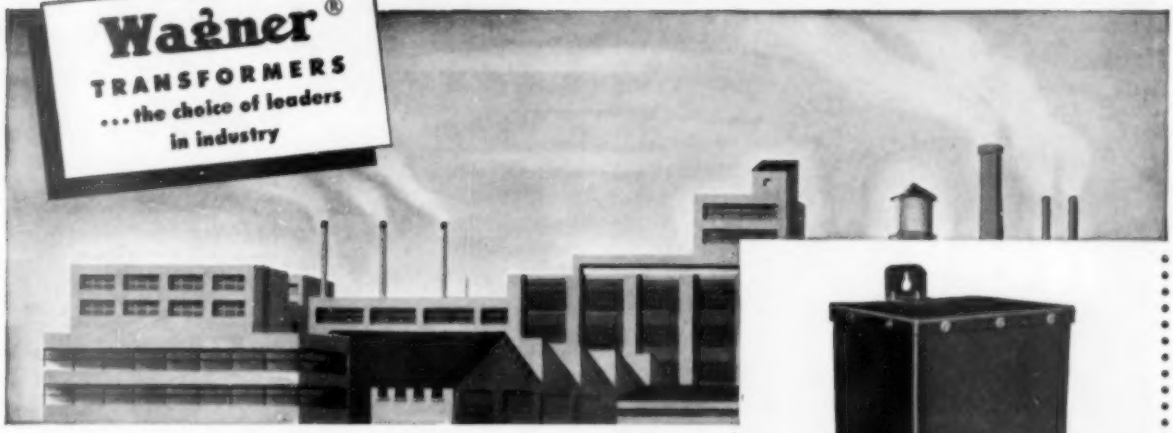


YOU SAVE MONEY 3 WAYS
with Wagner Dry-Type Transformers

1. shorter runs of copper
2. reduced line losses
3. lower installation expense

For portable tools, machines or lighting systems, these compact, light-weight Wagner Dry-Type Transformers get the *right* voltage close to the load—give you a flexible, modern power system.

The 150° rise, totally-enclosed dry-type transformer is designed especially for use where ventilated transformers are impractical. Core and coil is protected from lint, moisture, dust and other contaminating materials by totally-enclosed sheet steel cases . . . and this kind of protection reduces maintenance to almost nothing. They can be installed outdoors, because their construction is completely weatherproof.

The 150° rise transformer is standard in ratings 3 through 10 kva and is also available through 50 kva. The 55° rise model is standard in 1, 1½ and 2 kva and the 80° rise transformer is standard in ratings 15 through 100 kva.

Higher voltage single-phase transformers and three-phase transformers in ratings above 112½ kva are housed in ventilated enclosures formed of structural steel with removable panels. They are designed for floor or platform mounting and are suitable for indoor use only.

Write today for Bulletin TU-57.

Single-phase
Dry-Type Transformer. 150°C.

Single-phase
Dry-Type Tranformer. 55°C.

Three-phase
Dry-Type Transformer. 80°C.

Wagner Electric Corporation
6412 Plymouth Ave., St. Louis 14, Mo., U. S. A.

Wagner Electric Corporation EST. WE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

T56-3

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

Nonskid, light, corrosion resistant

Alcoa® Abrasive Tread Plate is a strong aluminum alloy with gritty aluminum oxide rolled into the surface.

It's so nonskid you can walk right up a 30° incline, even when it's wet, greasy or covered with oil!

This tread plate won't lose its grip. Wearing it down simply exposes more rolled-in grit! It's two-thirds lighter than steel. It comes in many sizes and thicknesses. It's easy to punch, cut, form, weld, shear, etc.

THINK—Where can you use this light, corrosion-resistant tread plate? It's ideal for factory floors, ladder treads, train vestibules, plates, truck trailers, marine decking, elevator floors and sills and many other uses. See your Alcoa distributor.

ALWAYS FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM MILL PRODUCTS

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

GET FREE SAMPLE OF ALCOA TREAD PLATE AND FREE BOOK!

ALUMINUM COMPANY OF AMERICA
1667-L Alcoa Building, Pittsburgh 19, Pa.

Gentlemen:
Please send free sample of *Alcoa Abrasive Tread Plate* and informative 8-page booklet.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

PAASCHE

PRESENTS A NEW LOW COST WATER WASH FINISHING BOOTH

TOP EFFICIENCY IN PERFORMANCE
LOWER COST TO INSTALL
LOWER COST TO OPERATE

This Paasche efficiency finishing booth, built to meet requirements of the National Board of Fire Underwriters, will pay for itself in minimum installation costs, lower plant maintenance costs, and reduced rejects. The non-clogging water nozzles give high efficiency air washing. Available in a full range of sizes in floor and shelf types. Heavy duty construction — manufactured from 18 gage steel with companion flanges and bolt holes at 6″ centers. Simple sludge removal, ease of cleaning, high efficiency with less down time cuts maintenance costs. Consult your classified directory for nearest Paasche representative or write for complete specifications.

PAASCHE AIRBRUSH COMPANY
A Division of Cline Electric Manufacturing Company
1909 W. DIVERSEY PARKWAY • CHICAGO 14

READ BETTER TO LEAD BETTER!

ADD to your background for leadership—take in more ideas and facts—quicker. Clear away routine office reading sooner. Save valuable time for the active problems of management. You can do all this and more with *faster reading ability*, gained by the simple methods shown in this book.

Today's executive faces an ever-growing flood of reports, memos, correspondence, newspapers, magazines, books, and other reading—reading he *must* do to keep on top of his job. This book gives the instructions, exercises, reading selections, eye-span improvement, vocabulary development, and everything else you need to build reading speed *and comprehension* up to 300 words a minute more. Use it to overcome *your* executive reading problem—equip yourself with the "keep-abreast" knowledge and the release of valuable time you need for success in planning, deciding, and *leading* in your job today.

BUSINESS WEEK says

"The higher a man climbs up the executive ladder, the more he has to read. How to cope with this added load is one of management's continuing problems."

Gives you tested methods, from The Reading Institute, New York University

Increase your reading speed up to 300 WORDS PER MINUTE!

This new book shows you how, with a complete plan, instructions, exercises, and self-checking aids

READING IMPROVEMENT FOR ADULTS

By PAUL D. LEEDY

Supervisor, The Reading Institute, New York University

456 pages, 6 x 9, $5.95

CONTENTS

1. You *Can* Improve Your Reading
2. What Does It Mean to Read Well?
3. How Well Do You Read—Now?
4. Why Paragraphs?
5. How Flows the Thought?
6. Punctuation: The Traffic Lights of Reading
7. Higher Speed with Less Effort
8. What Is Your Purpose in Reading?
9. Skimming—Key to Rapid Reading
10. Reading to Follow Directions
11. How to Remember What you Read
12. Why Did the Author Write This?
13. Readability as an Aid to Better Reading
14. How to Read a Newspaper
15. Graphs, Maps, Charts, and Other Visual Aids
16. Meeting the Reading Demands of Business
17. Reading the Technical Report
18. Reading for Enjoyment
19. How Well Do You Read—Now?
20. Word Power

Appendix—Reading Improvement and the use of Instruments
Table of Reading Rates
Selective Bibliography

Answer Key

HERE are proved reading methods that enable you to zip through reports, memos, letters, and other paper work, plus all the news and technical journals and periodicals that come your way—and remember them better than ever before!

All you need is your watch, an index card, and this easy-to-follow book. Leedy gives you the secrets of skimming, pointers on remembering, hints on reading technical reports, and methods of "telegraphic" reading.

You get step-by-step directions for improving your eye-span and a new vocabulary-building technique. You learn how to catch the "flow of thought," use punctuation in skimming, spot main ideas at once, and use charts for speed.

These techniques have *proved* workable for more than 10,000 executives, salesmen, engineers, and housewives at the Reading Institute . . . and now they are here, to speed up *your* reading, and progress . . . amazingly.

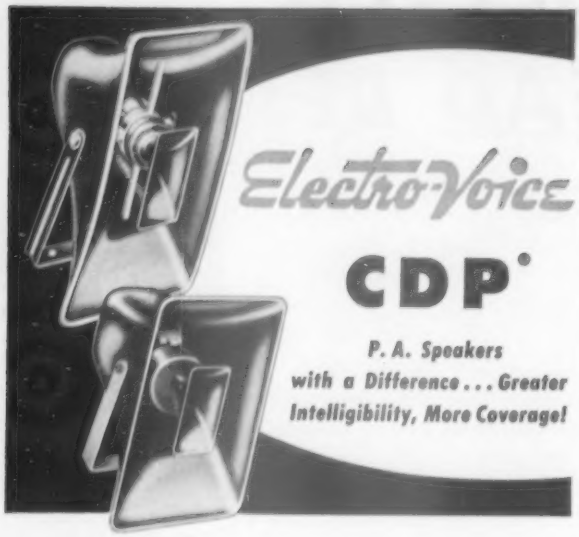
FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., INC., Dept. Fac-11
327 W. 41st St., New York 36, N. Y.

Send me **Leedy's Reading Improvement for Adults** for 10 days' examination on approval. In 10 days I will send **$5.95**, plus few cents for delivery costs, or return book postpaid. (We pay delivery costs if remittance is sent with this coupon; same examination and return privilege.)

For price and terms outside U. S. write McGRAW-HILL INTL., N. Y. C.

(Print)
Name _____
Address _____
City & Zone _____ State _____
Company _____
Position _____ Fac-11



Electro-Voice

CDP®

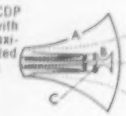
P. A. Speakers with a Difference . . . Greater Intelligibility, More Coverage!

Why CDP Speakers are overwhelmingly superior to conventional P. A. horns . . .

High frequencies require one throat size and one horn taper rate; low frequencies require a different throat size and a different taper rate. The Electro-Voice CDP gives you a large horn (A), for lows and a second, smaller horn (B), coaxially mounted, for highs working from both sides of a single diaphragm (C). The Electro-Voice CDP gives you 2½ more octaves of sound reproduction . . . frequencies up to 10,000 cps. These 2½ octaves are indispensable for highest intelligibility. See the curve, compare response and efficiency. In addition, Electro-Voice CDP speaker disperses sound through a solid 120° angle for the widest coverage available in P. A. speakers.

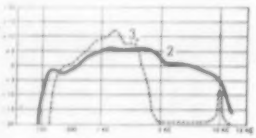
You can hear the difference.

1 This is a CDP Speaker with its two coaxially mounted diffraction horns.

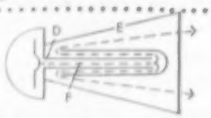


2 This is the frequency response curve of a CDP.

3 This is the frequency response curve of a conventional P.A. horn.



4 This is a conventional reentrant-type P. A. horn.



Conventional reentrant horns using single throat (D) and single horn (E) transmit highs along the same circuitous path (F) as required for lows. As a result, the highs become attenuated, sharply decreasing intelligibility. Electro-Voice gives you P. A. speakers with a large horn for lows and a second, smaller horn, coaxially mounted, for highs.

There is a difference and you can hear it.

CDP speakers are weather-proof, blast-proof and splash-proof, virtually indestructible. They're molded of fiberglass for better acoustical properties and extra strength.

Electro-Voice®

ELECTRO-VOICE, INC., BUCHANAN, MICHIGAN
CANADA: E-V of Canada Ltd., 1908 Avenue Road, Toronto, Ontario; Export: 13 East 40th Street, New York 16, U. S. A.; CABLES: ARLAB.

Write Dept. FM611 for full information.

WANT SOME REAL JOB HELP?

Here's a list of reprints which have already proved their value to Factory readers.

The subjects covered in these reprints are varied. Many of them you might wish to have for your own personal library. Others you may want to order in larger quantities for distribution to people in your organization. First come, first served. Write to: Editor, FACTORY

How to Use Your Time Better
How to Improve Your Memory
How to Read Faster and Better
Tips on Talking Better
Work Sampling**
Sonic Energy**
How You Can Use Radioisotopes**
How Good A Leader Are You at Getting Better Production
How to Pick People Better
Telling Employees Where They Stand
How Good a Leader Are You
How to Solve Your Parking Problems
Organizing for Disaster
How to Protect Your Plant
Report on Incentives for Supervisors
Worker Psychology: Formula That Works
How to Write Better Letters to Employees
Electronic Controls
Merit Rating Plan for Executives
How to Be Interviewed
Operations Research
The Sad Case of Company X
What to Do When the Union Knocks at Your Door
Factory's Cost Index**
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Six Steps to Better Inventory Control
Make Statistical Methods Easier to Understand
Your Ideas: How to Put Them Across
Nine Steps to Better Quality
Work Sampling Without Formulas
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How's Your Health?
How to Think and Act Like an Executive
How to Start a Training Program
10 Tools to Control Vendor's Quality
Squeeze is on the Production Supervisor
Writing Reports That Get Action
Newest Way to Figure Payoff
What Automation Means to America
Universal Maintenance Standards
More from Your Suggestion Plan
18 Ways to Lower Maintenance Costs
Measure Maintenance Performance**
Relax, Pal, Relax**
Mechanized Maintenance Control**
How to Make Good Ideas Come Easy**
What Computers Can do for You**
Brainstorming—to Solve Plant Problems**
How Good is Good Morale
You Can Be Boss of Your Desk
Good Foremen Today May Be Misfits Tomorrow

Prices for all reprints listed above, except those starred, are:

Single copies—35¢ each
100-299 copies—25¢ each
300-499 copies—20¢ each
500 copies up—15¢ each

**Single copies—50¢ each
100-299 copies—35¢ each
300-499 copies—25¢ each
500 copies up—20¢ each

Shipping charges will be added to all orders for over 50 copies.

HOW 50¢ CAN HELP YOU DO A BETTER JOB

Wouldn't you like to have—right in your own file—copies of complete, authentic articles on important Plant Operating subjects? You *can*. That's why FACTORY prints its famous Plant Operation Libraries.

They are 12- to 36-page articles reprinted from FACTORY's own pages. Many have been widely used by some of the largest manufacturing plants in the country.

The price is only 50¢ each. Pick the subjects you're interested in. Order as many as you need. You can use the handy coupon.

Maintenance

112. The Management of Maintenance
113. Principles of Maintenance Control
129. Keep Your Plant Up—Keep Your Costs Down
137. How to Build a Maintenance Program Now
139. Maintenance Control that Really Controls
140. How to Boost the Maintenance Department's Productivity
144. What Should Maintenance Cost?
145. How to Find and Control Your Maintenance Costs
154. Work Measurement in Maintenance
157. BEST IN PLANT MAINTENANCE (8 outstanding articles from 1955 FACTORY)
160. Preventive Maintenance

Plant Layout

15. Plant Layout
125. Adopt the Best in Plant Layout—

Plant Services

118. Painting the Plant
131. Making Fullest Use of Mechanical Service Equipment
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146. Today's Lubricants
149. Select the Right Floors
150. Install Floors for Long Life
151. Make Floors Last Longer
156. Air Pollution — A Big Problem Today
159. Prepare for Hurricanes

Industrial Relations

45. Foremanship Fundamentals
47. The Foreman on His Job
102. When Foreman Deals With Worker
115. Profit Sharing Plans in Industry
117. How to Plan and Run Open House
128. Providing the Best in Employee Training
152. Stop the Thief in Your Plant

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38. How to Rate Jobs and Men
86. Motion-Time Standards
109. Methods-Time Measurement
130. Plan and Control Production
133. Wage Incentives
135. How Good Is MTM?

Materials Handling

147. Materials Handling in Today's and Tomorrow's Plants
155. How to Get More for Your Handling Dollar

Electrical

101. Your Electric Motor
153. Electricity is Everybody's Business

Costs

119. How to Organize for Cost Reduction
121. Telling Employees Why Costs Must Be Cut
132. Profit Leaks—How to Find Them and Plug Them

MAIL THIS COUPON

Editor, FACTORY 11-56
330 West 42nd St., New York 36, N. Y.

Please send me ..... copies each of the reprints represented by the numbers circled at **50¢ per copy** (special rates for 100 or more.)
I enclose check ( ), money order ( ) for $ .....

Name .....

Address .....

City ..... Zone ..... State .....

15, 38, 45, 47, 86, 101, 102, 109, 112, 113, 115, 117, 118, 119, 121, 125, 128, 129, 130, 131, 132, 133, 135, 137, 139, 140, 142, 144, 145, 146, 147, 149, 150, 151, 152, 153, 154, 155, 156, 157, 159, 160

INDUSTRIAL CONSULTANTS

DRAKE, STARTZMAN, SHEAHAN and BARCLAY
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
41 East 42nd Street New York 17, N. Y.

THE EMERSON ENGINEERS
Management Counselors
Established 1899
Inventory Controls
30 Rockefeller Plaza New York 20, N. Y.

GEMAR ASSOCIATES
CONSULTING
MATERIALS HANDLING
ENGINEERS
Over 20 Years Experience
Greenwich, Connecticut

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
718 Wallace Ave.—Pittsburgh 21, Pa.

ALDEN E. STILSON & ASSOCIATES
LIMITED
CONSULTING ENGINEERS
E. RALPH SIMS, Jr. INDUSTRIAL ENGINEER
MANUFACTURING & DISTRIBUTION STUDIES
245 NORTH HIGH ST. COLUMBUS, OHIO

WALLEY & ASSOCIATES
MANAGEMENT CONSULTANTS
Job Evaluation
Foremen Training Programs
Wage Incentive Plans
323 Third National Bldg.—Dayton 2, Ohio

If you have a plant management problem, contact the appropriate consultants whose cards appear on this page. The offering of their special services nationally, justifies your confidence in their ability to give you competent counseling that can effect appreciable SAVINGS for you.

EMPLOYMENT OPPORTUNITIES

NATIONAL COVERAGE

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

Positions Vacant	Civil Service Opportunities	Employment Agencies
Positions Wanted	Selling Opportunities Wanted	Employment Services
Part Time Work	Selling Opportunities Offered	Labor Bureaus

RATES

DISPLAYED

The advertising rate is $33.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

UNDISPLAYED

$2.10 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to FACTORY MANAGEMENT & MAINTENANCE, 330 W. 42nd St., N. Y. 36, N. Y., for December issue closing November 13th

EMPLOYMENT

REPLIES (Box No.):
Address to office nearest you
c/o this publication, Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Machine Shop Assistant needed by medium sized heavy process machinery manufacturer. Young college engineer graduate with some experience preferred. Position has a future. First duties will cover rate setting, carbide tool development and assist in increasing productivity. Company has liberal profit sharing plan. Salary open. Location S.E. Penna. Reply P-7620, Factory Management & Maintenance.

Time Study engineers Industrial engineers needed by manufacturers of John Deere Farm Machinery. At least one year's experience required. Write to Industrial Engineering Division, Deere and Company, Moline, Illinois.

Assistant or Associate Professor in industrial engineering. Need experienced man from diversified industries in production planning and control, tooling and mechanization, and other production areas. Research facilities in these areas, cooperative industries assist. Advanced degrees helpful. Excellent consulting opportunities. Beautiful campus. 9 month contract. Some teaching experience desirable; can develop new courses. Salary open. Write Department of Industrial Engineering, Washington University, St. Louis 5, Mo.

EMPLOYMENT SERVICES

Salaried Personnel $5,000-$30,000. This confidential service, established 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D, P. O. Box 674, Manchester, Vermont.

Salaried Positions $6,000 to $35,000. We offer the original personal employment service (established 46 years). Procedure of high standards individualized to your personal requirements. Identity covered. Particulars—R. W. Bixby, Inc., 558 Brisbane Bldg., Buffalo 3, N. Y.

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STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF

Factory Management and Maintenance published Monthly at New York, New York, for October 1, 1956.

1. The name and address of the publisher, editor, managing editor, and business manager is: Publisher McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N. Y.; Editor M. J. Murphy, 330 West 42nd Street, New York 36, N. Y.; Managing editor, L. K. Urquhart, 330 West 42nd Street, New York 36, N. Y.; Business Manager, W. J. Thierer, 330 West 42nd Street, New York 36, N. Y.

2. The owner is McGraw-Hill Publishing Company, Inc. 330 West 42nd St., New York 36, N. Y. Stockholders holding 1% or more stock are: Donald C. McGraw and Willard T. Chevalier, Trustees under Deed or Trust dtd. 1/14/31, as amended, m/b James H. McGraw, deceased; Donald C. McGraw and Harold W. McGraw as Trustees under Indenture m/b James H. McGraw dated 7/1/37, as amended: Donald C. McGraw, individually; Harold W. McGraw, individually; Elizabeth M. Webster, c/o Donald C. McGraw (all of 330 West 42nd St., New York 36, N. Y.); Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., La Jolla, Calif.; Geneva & Co., P.O. Box 491, Church St. Station, New York, N. Y.; Merrill, Lynch, Pierce, Fenner & Beane, 70 Pine St., New York, N. Y.; Touchstone & Co., c/o Wellington Fund, Inc., Clayton, Delaware.

LEGAL NOTICE—(Cont.)

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4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

McGRAW-HILL PUBLISHING COMPANY, INC.
By JOHN J. COOKE, Secretary

Sworn to and subscribed before me this 14th day of September, 1956.
[SEAL] JANET A. HARTWICK
(My commission expires March 30, 1957)

FOR RATES OR INFORMATION About Classified Advertising,

Contact The McGraw-Hill Office Nearest you.

ATLANTA, 3
1321 Rhodes-Haverty Bldg. *WAlnut 5778*
M. MILLER

BOSTON, 16
350 Park Square *HUbard 2-7160*
H. J. SWEGER

CHICAGO, 11
520 No. Michigan Ave. *MOhawk 4-5800*
W. HIGGENS — J. BRENNAN

CINCINNATI, 37
1825 Yorktown Rd., Swifton Village, Apt. 2 *REdwood 1-3238*
G. MILLER

CLEVELAND, 15
1510 Hanna Bldg. *SUperior 1-7000*
W. SULLIVAN

DALLAS, 2
Adolphous Tower Bldg., Main & Akard Sts. *RIverside 7-5064*
D. BILLIAN

DETROIT, 26
856 Penobscot Bldg. *WOodward 2-1793*
W. STONE

LOS ANGELES, 17
1125 W. 6th St. *MAdison 6-9351*
G. FRUHLING — D. McMILLAN

NEW YORK, 36
330 West 42 St. *LOngacre 4-3000*
D. COSTER—R. LAWLESS—S. HENRY—R. HATHAWAY

PHILADELPHIA, 3
17th & Sansom St. *RIttenhouse 6-0670*
H. BOZARTH — E. MINGLE

ST. LOUIS, 8
3615 Olive St. *JEfferson 5-4867*
W. HIGGENS

SAN FRANCISCO, 4
68 Post St. *DOuglas 2-4600*
W. WOOLSTON

MECHANICAL ENGINEER
OR CHEMICAL ENGINEER

Degree in Mechanical or Chemical Engineering with two or more years experience on high pressure equipment preferred though not required. Permanent position on staff of a progressive chemical company located in Tuscola, Illinois. Liberal personnel benefit program. Send resume of background and qualifications to:

NATIONAL PETRO CHEMICAL COMPANY
Attention: Personnel Department
P.O. Box 109, Tuscola, Illinois

CUSTODIAL SUPERVISOR

Midwest metropolitan educational group interested in forward looking, service-minded, ambitious and experienced man for approximately a 90 man janitorial operation. Under 45 years of age. Submit resume and salary requirements.

P-3204, Factory Management & Maintenance
526 N. Michigan Ave., Chicago 11, Ill.

Salaried Positions $6,000 to $30,000

Hi-grade Engineers and Executives in all fields of industry.

GLOBE EMPLOYMENT SERVICE
42 S. 15th St., Philadelphia 2, Pa

EMPLOYMENT PROBLEM?

When you are in need of specialized men for specialized jobs, contact them through an employment ad in this publication.

ENGINEERS

For the young management-minded engineer there are unusual opportunities with one of America's leading food processors in the following fields:

PACKAGING
MAINTENANCE
ELECTRICAL
INDUSTRIAL

Assignments to staff or line engineering dependent upon individual's experience and training.

Prefer men under 35 with professional training in field of specialization. Minimum of one year's experience in processing type industry. Send detailed resume indicating education, experience salary expectation, and location flexibilty to:

H. A. B.
PILLSBURY MILLS, INC.
MINNEAPOLIS 2, MINN.

FOREMAN

STARTING SALARY $8000 PER YEAR.
No degree required. Practical experience in Radio and Electronics. Familiar with methods breakdown, training, line set up, etc. Co. pays agency fee and relocation expenses. Write in strict confidence.

MONARCH PERSONNEL
28 E. Jackson Blvd. Chicago 4, Ill.

EXECUTIVES AND TECHNICAL MEN
Desiring Positions with Stability

We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $30,000 per year. Confidential. Est. 41 years.

(Inquiries from Employers entail no obligation)
THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

AREA ENGINEERS

Several graduate engineers with minimum 5 years' experience supervising maintenance engineering functions in oil refining or producing facilities power plants, heavy industrial installations, manufacturing plants or related operations. To establish technical supervision, procedures, maintenance operations and schedule routine and special work for major oil producing and refining operation with all supporting facilities; i.e., housing, feeding, recreation, etc.

Salary commensurate with background and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 140

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

DRAKE PERSONNEL
National Placement Center for
EXECUTIVE AND TECHNICAL PERSONNEL

General and Plant Managers
Plant Superintendents—Foremen
Accounting—Staff Personnel
Engineers: Design—Production
Sales Managers—Engineers

Please outline briefly your experience or personnel needs to:

John Cope
220 S. State St., Chicago 4, Ill.
HArrison 7-8600

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

BUSINESS OPPORTUNITIES — EQUIPMENT - USED or RESALE

RATES

UNDISPLAYED

$2.10 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

PROPOSALS, $2.10 a line an insertion.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED

The advertising rate is $22.40 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns 30 inches—to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

Send NEW ADVERTISEMENTS to N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. for December issue closing November 13th

NEED PLANS FOR PLANT SURVIVAL?

Let us help you

Accident Prevention Institute

P. O. BOX 11724
DALLAS, TEXAS

—TRANSFORMERS—

BOUGHT AND SOLD

We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.

Custom-built transformers and coils manufactured to your specifications.

Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

THE ELECTRIC SERVICE CO., INC.
5321 Hetzel St. Cincinnati 27, Ohio
40 Years' Dependable Service

SPECIAL SERVICE

Time Study Boards with transparent watch holders, stop watches, Pedometers, Slide Rules. Forms in stock. Sample kit free. Oznam Products Co., 5544 So. Homan Ave., Chicago 29.

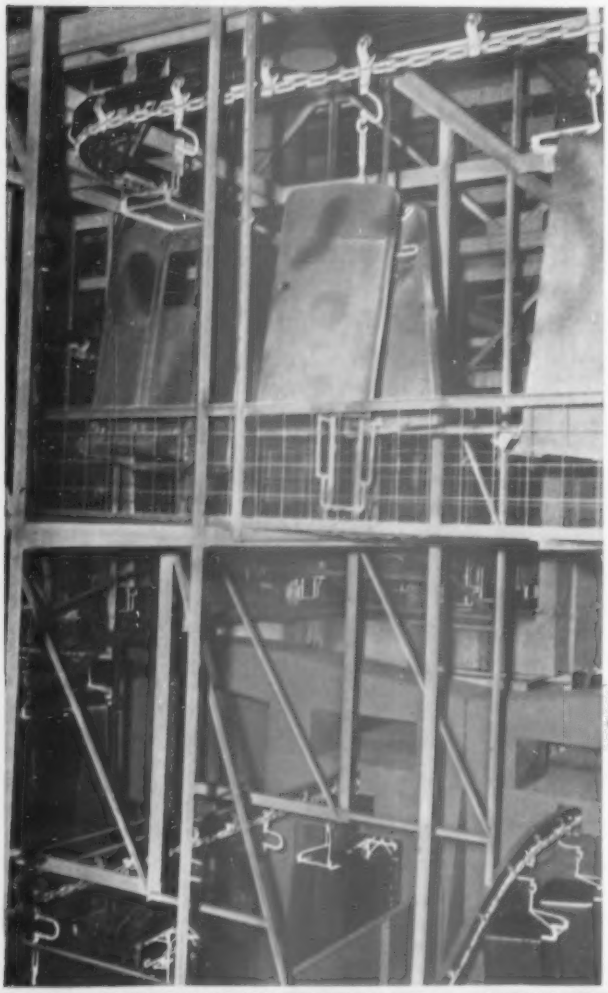
For Your Selected Personnel
PRODUCTION CONTROL
4 week Specialists training program starts November 28th.
INDUSTRIAL ENGINEERING COLLEGE
3309 Washington Blvd., Chicago, Ill.
Since 1938

BALERS WANTED

New and Rebuilt Baling Presses

AMERICAN BALER MACHINES CO., INC.
123-10 101st Ave., Richmond Hill, L. I., N.Y.

Combines multiple processes in a
continuous, straight-line operation



LINK-BELT overhead trolley conveyors carry refrigerator and freezer parts through finishing and inspection

DON'T presume that restricted space and complicated processing prevent the economies of straight-line production in your plant. Those same problems faced Rex Manufacturing Co. (Division of Philco Corp., Connersville, Ind.)—and were overcome by a versatile system of 15 Link-Belt overhead trolley conveyors, totaling over 10 miles in length.

Whether you require movement of material from floor to floor or building to building, the path of a Link-Belt overhead trolley conveyor can be arranged so it drops down to work areas and then rises out of the way where headroom is required. Whatever your lay-out obstacles, our conveying specialists will set up steady, straight-line production . . . utilize now-wasted ceiling space and release valuable floor area.

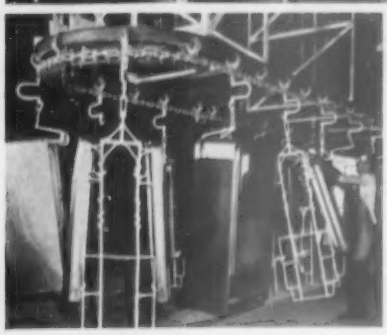
That's why it will pay you to call on Link-Belt when considering modernization of your handling methods. You can reach a trolley conveyor specialist through your nearest Link-Belt office. Or write for Book 2330.

• • •

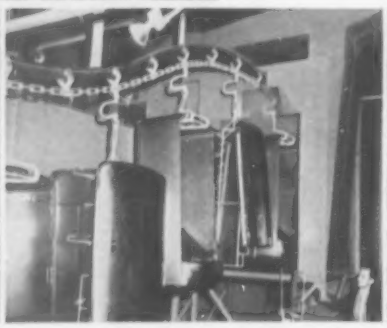
TWO-LEVEL MAIN CONVEYOR, 4,596 ft. long, carries parts to and from spray coating and washing operation through automatic spray booth for prime coat of paint. System handles six sizes of freezers, four sizes of refrigerators.

LINK-BELT

IN-THE-FLOOR AND OVERHEAD TRUKVEYORS
OVERHEAD TROLLEY CONVEYORS



ATTACHMENTS — from the complete selection offered by Link-Belt — carry refrigerator doors and casings safely.



PARTS ARE COUNTED as they enter phosphate coating and washing machine. They then travel to 350°F drying oven.

FINAL INSPECTION is accomplished in transit prior to assembly. Rejects are returned to main conveyor.

14,104

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

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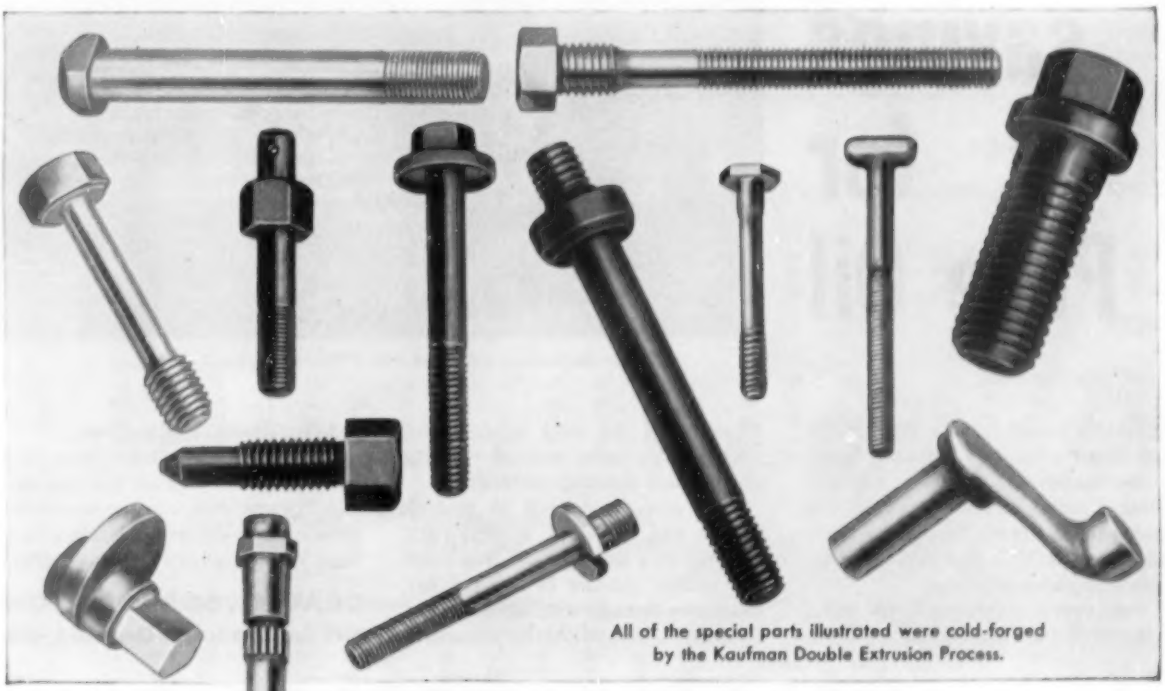
Your unusual, non-standard parts

are "naturals" for Cleveland's Custom Production . . . Applying 40 years experience making *Top Quality* Cap Screws . . .

Simplify your special parts production problem. Your quantity-run designs are handled by Cleveland to your complete satisfaction, with savings in time, cost and machining. And they're stronger, more dependable as made by our Kaufman Process with our long specialized experience in cold extrusion and hot heading.

We work to your exact design and materials specifications—or stand ready to offer our suggestions for improvement in either, if you want them. Watchful control follows your job; preparation and testing of material, checking in process, and final inspection, to assure you parts as you want them—physical properties as desired, uniform, accurate to close tolerances, concentric, correct pitch diameter, proper heat treating, and other limits that may apply.

Find out how Cleveland Custom Service can help you in your special parts production. Write for folder on special headed and threaded products.

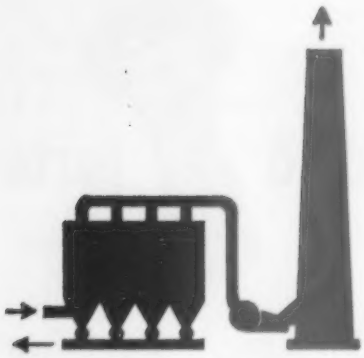


All of the special parts illustrated were cold-forged by the Kaufman Double Extrusion Process.

The Cleveland Cap Screw Company

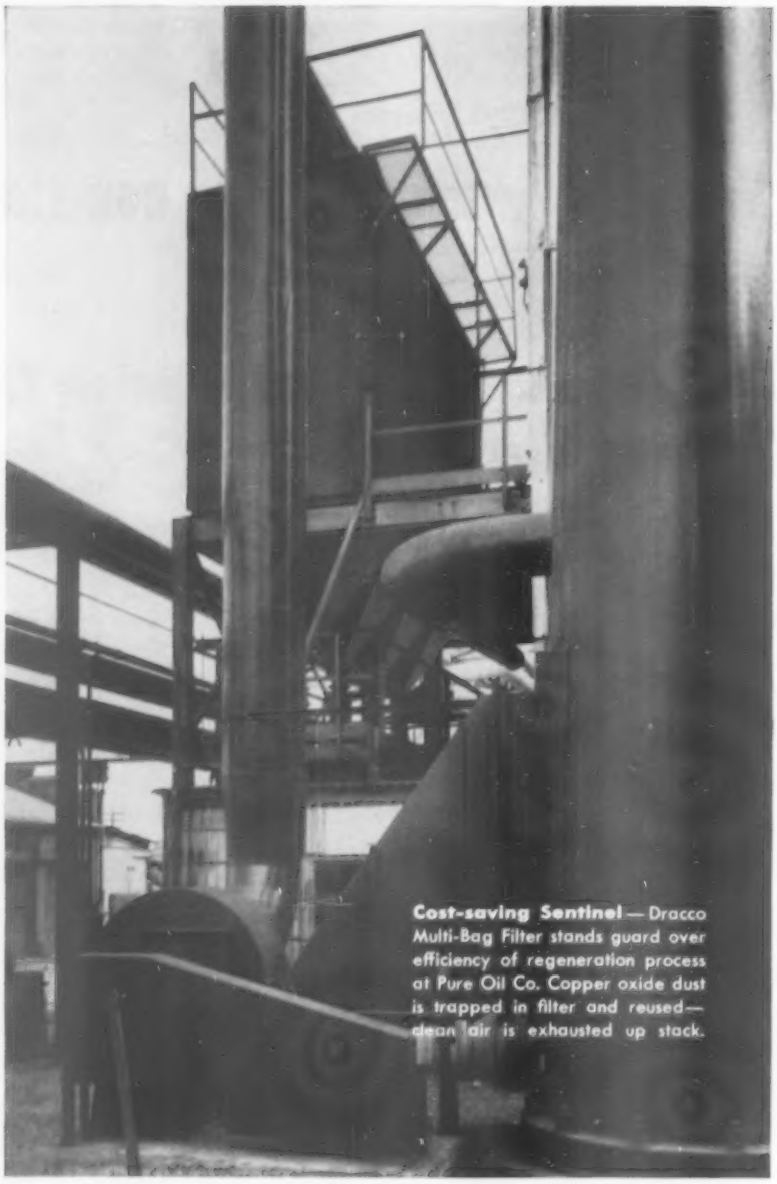
2923 East 79th Street • Cleveland 4, Ohio • VUlcan 3-3700 TWX CV-42

Warehouses: Chicago • Philadelphia • New York • Providence • Los Angeles



DRACCO RECOVERY SYSTEM AT REFINERY MEANS:

pure air, sure savings for Pure Oil



Cost-saving Sentinel—Dracco Multi-Bag Filter stands guard over efficiency of regeneration process at Pure Oil Co. Copper oxide dust is trapped in filter and reused—clean air is exhausted up stack.

At its Toledo refinery, Pure Oil Co. has halted escaping dust from a copper oxide regeneration process with Dracco Dust Control equipment. This dust problem was a costly nuisance—wasting valuable chemicals and causing undesirable working conditions.

Pure uses a cupric oxide for sulfur removal during refining of naphthas. Regenerating the spent cupric sulfide back to the oxide requires roasting, grinding and handling operations.

Dust is now trapped at multiple sources and recovered at 99½-100% efficiency in a Dracco Multi-Bag Filter. The system operates 24 hours a day, exhausting clean air with no visible dust. Savings are realized by returning collected copper oxide to process.

For Pure Oil Co., Dracco Dust Control now means pure air and cost savings. For *your* plant, a custom-engineered Dracco system can provide similar advantages. Why not call or write Dracco today?

DRACCO CORPORATION
4075 East 116th Street · Cleveland 5, Ohio

Bulletin 800 is Dracco's 40-page catalog on dust control and recovery. Contains detailed facts and figures on all dust control equipment. For your copy, write Dracco today.

DRACCO *Performance Proved*
Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

HERE'S A HANDY POSTCARD THAT WILL HELP YOU –

GET MORE INFORMATION

How to use this Reader Service Card . . .

The bottom of this page is a postcard—you'll note that the page has been perforated so you can tear it out easily. This postcard makes it easy for you to get more information on anything that's advertised in FACTORY, or listed in FACTORY's *Catalog News, Equipment News,* and *Materials News Sections.*

Catalog News Section: Starts on page 158. FACTORY's Editors look at scores of catalogs each month, and select those that will be most helpful to you. In the Catalog News Section of the postcard, circle the numbers corresponding to the numbers of the catalogs you want. You'll get them—without obligation—direct from the manufacturer.

Equipment News Section: Starts on page 160. Here FACTORY's Editors describe various kinds of new equipment that will help you solve plant problems. In the Equipment News Section of the postcard, circle the numbers of the items you'd like to know more about. You'll get information direct from the manufacturer—without obligation.

Materials News Section: Starts on page 306. Out of the many new materials announced each month, FACTORY's Editors pick out those most useful to you. In the Materials News Section, circle the items you want to know more about. You'll hear direct from the manufacturer—no obligation.

Advertising Section: The postcard has numbers corresponding to the page numbers of the advertisements. Circle the page numbers of those you're interested in. Where more than one advertisement is on a page, the letters L, R, T, B indicate location: left, right, top, bottom.

Then be sure: Fill out your name, address, and other information in the space provided, tear out the card, drop it in the mail. The data requested will be forwarded to you shortly.

FACTORY: Send me more information about . . . **NOVEMBER 1956**

(Good until January 31, 1957)

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Fourth Cover

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...at the advertising in this FACTORY issue

...at FACTORY's Catalog News Section

...at FACTORY's Equipment News Section

...at FACTORY's Materials News Section

...and then circle on this handy postcard the items you want to know more about.

It's an easy way to get information on any subject you are interested in—you can build your own data file. And you can do it without cost.

Every month in FACTORY you can use this free service to get useful literature. And every month in FACTORY's advertising pages, leading manufacturers show you new ways, better ways to cut costs, boost production.

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POSITION .....

COMPANY .....

ADDRESS .....

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PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed In The United States

4¢ — POSTAGE WILL BE PAID BY —

McGRAW-HILL PUBLISHING CO., Inc.
Reader Service Department

FACTORY Management & Maintenance

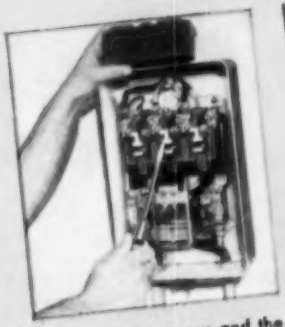
330 WEST 42nd STREET

NEW YORK 36, N. Y.

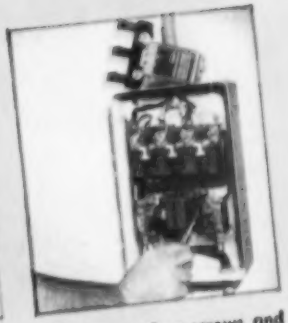
Here's Why We Specify
SQUARE D Starters
on the Machinery We Buy

PERFORMANCE, EASY INSPECTION AND MAINTENANCE

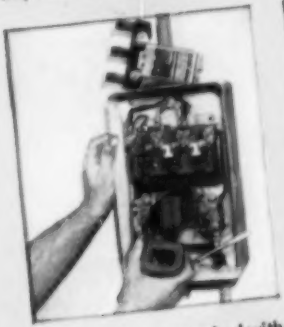
Sure, we like Square D performance because it keeps our "down time" at a minimum. BUT—everybody knows that even the best starter needs periodic inspection and preventive maintenance. We like the way Square D makes it easy to handle those routine jobs.



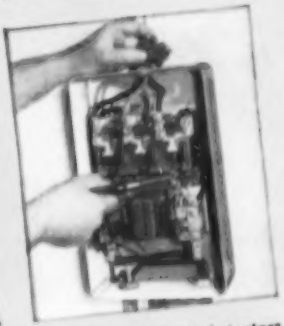
1 Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.



2 Remove four screws and entire movable assembly can be lifted off. Disconnect two wires and slip off magnet coil.



3 Contacts are attached with separate screws—they can be removed and replaced without disturbing any wiring. A screwdriver is the only tool needed.



4 Sizes 0 through 4 starters have these separate mounting electrical interlocks for easier installation. Contact block is attached from front of panel with two screws.

OFF-THE-SHELF PARTS KITS

They make normal maintenance and modifications easier than ever. Packaged parts include interlocks, contacts, coils, overload relays, pushbuttons and selector switches. They're easy to buy, easy to identify, and faster to install.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

Wright cranes keep engines flying through world's largest line-maintenance hangar

...with the help of 480 TIMKEN® bearings

24 motor-driven Wright cranes like the one shown keep engines winging from station to station in the world's largest line-maintenance hangar at Miami. And keeping the cranes on the go are 480 Timken® tapered roller bearings on the bridge wheels and trolley wheels.

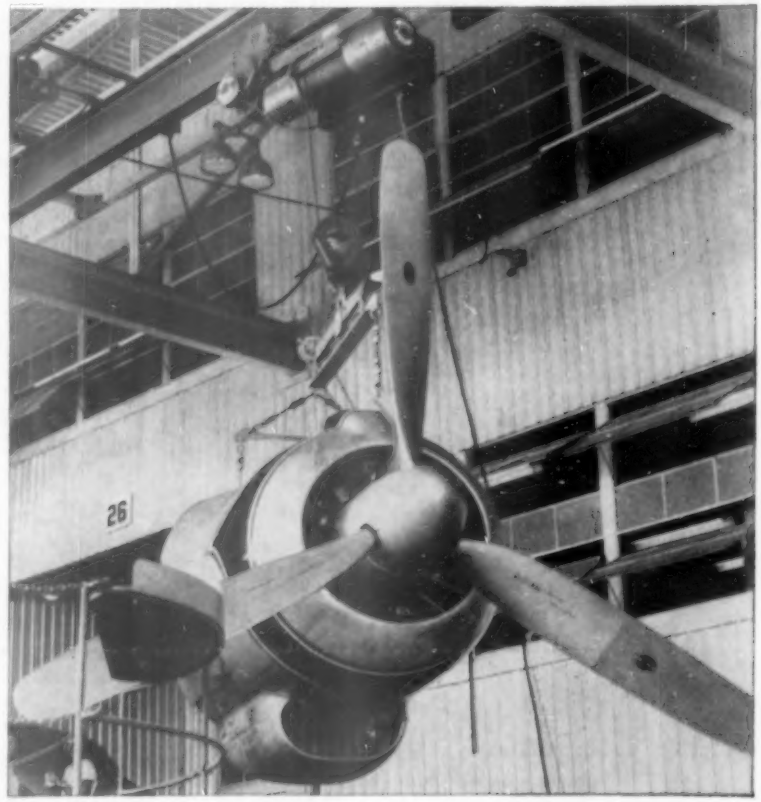
Timken bearings take both the radial loads imposed by the weight of the engines and the thrust loads set up by the pendulum motion of crane operation. The tapered design of Timken bearings lets them take radial and thrust loads in any combination. And full line contact between rollers and races gives these bearings extra load-carrying capacity. Downtime is cut, cranes are kept on the go.

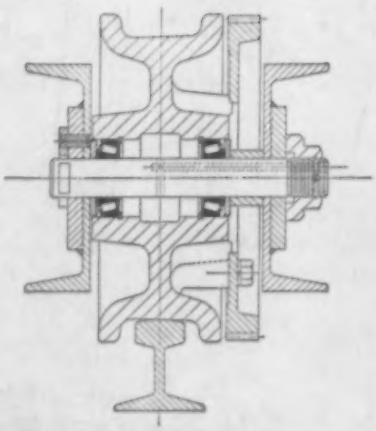
Friction is virtually eliminated with Timken bearings. They're designed by geometric law to have true rolling motion—precision manufactured to live up to their design. Cranes roll smoothly with a minimum of wear and maintenance. And to take the shock loads often encountered, rollers and races of Timken bearings are case-carburized to give them wear-resistant surfaces over tough, shock-resistant cores.

Be sure you specify Timken bearings when you build or buy a machine. To give you the *finest* roller bearings, we even make our own fine alloy steel. We're America's only bearing manufacturer that does.

Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





How the **WRIGHT HOIST DIVISION** of American Chain and Cable Co. mounts Timken tapered roller bearings on the truck wheels of its cranes to take the loads, keep them on the go.

TIMKEN *TAPERED ROLLER BEARINGS ROLL THE LOAD*

TRADE-MARK REG. U. S. PAT. OFF.